[COMMITTEE PRINT]

JAPANESE TECHNOLOGICAL ADVANCES AND POSSIBLE UNITED STATES RESPONSES USING RESEARCH JOINT VENTURES

REPORT

PREPARED BY THE

SUBCOMMITTEE ON
INVESTIGATIONS AND OVERSIGHT

AND THE

SUBCOMMITTEE ON
SCIENCE, RESEARCH AND TECHNOLOGY

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LETTER OF SUBMITTAL

Hon. DON FUQUA,
Chairman, Committee on Science and Technology,
House of Representatives, Washington, DC.

DEAR MR. CHAIRMAN: We are pleased to submit our report concerning Japanese Technological Advances and Possible U.S. Responses Using Research Joint Ventures. This report is based on hearings held on June 29 and 30, 1983.

The numerous bills that have been introduced on the subject of research joint ventures attest to the importance of this concept, particularly as it is affected by the Nation's antitrust laws. This report evaluates both the reasons for the interest in these ventures as well as the legal issues associated with their formation.

Notwithstanding the advantages associated with joint research, few research joint ventures have been formed in this country. To a significant degree, this may be attributable to concern over the Nation's antitrust laws. Even though such concern may be more perception than fact in that no judicial opinion has ever been held against a research joint venture on antitrust grounds, we are persuaded that such fear is real and has discouraged the formation of such ventures.

Because the Subcommittees view research joint ventures as beneficial to the U.S. competitive effort, we have recommended that legislation conducive to these ventures be enacted to address the legitimate concerns about antitrust litigation.

The Subcommittees wish to thank Jerome Ostrov, on assignment to the Investigations and Oversight Subcommittee and Dr. William Bedesem, ASME Congressional Fellow on assignment to the Science, Research and Technology Subcommittee, who assisted the Subcommittees in preparing this report.

Sincerely,

DOUG WALGREN,
Chairman, Subcommittee on Science, Research and Technology.

ALBERT GORE, Jr.,
Chairman, Subcommittee on Investigations and Oversight.

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I. INTRODUCTION

On June 29 and 30, 1983, the Subcommittee on Investigations and Oversight and the Subcommittee on Science, Research and Technology held joint hearings on the subject of Japanese technological advances and possible U.S. responses using research joint ventures. Those participating included representatives from affected industries such as electronics, computers and semiconductors, as well as the academic community, attorneys involved in antitrust law, the current and previous Administration, and representatives from ongoing research joint ventures.

The hearings were prompted by repeated accounts in the Nation's newspapers and trade journals regarding recent Japanese technological successes, particularly in microelectronics where collective research supported by the government is said to have greatly aided the Japanese efforts. In microelectronics, Japanese firms, who five years ago accounted for only 38 percent of the world market in 16K RAM (random access memory) microchips, now account for 66 percent of sales in the more advanced 64K RAM microchip market.

The hearings looked at Japanese industrial and research policy and explored a range of potential U.S. responses. As part of the Japanese overview, witnesses described Japan's historic approach toward high technology and industrial planning, the government's role in targeting certain activities and the ways in which it confers trade, tax and antitrust benefits on such activities.

Japan's policy tools have been reoriented as the nation turned its sights from a post-war reconstruction economy to one concerned about social welfare issues such as pollution control and energy conservation. Further, as a result of competition from resource and labor-rich, third-world countries, Japan has also altered its path from raw-material based industries such as steel-making toward technology-intensive areas such as computers and microelectronics. Amidst this changing activity, one policy instrument that remains as a central force in Japanese industrial policy is that of joint research.

In the semiconductor industry, coordinated research (partially underwritten by the Japanese government) has given Japanese companies a major share of the world market in 64K RAM microchips. In the computer industry, the Japanese government plans to invest several hundred million dollars in the Institute for New Generation Computing Technology (ICOT) program -- a program designed to yield an artificial intelligence or "fifth generation" computer by the end of the decade.

Unlike Japan, the United States did not have to rebuild its economy after World War II. Accordingly, the impetus for industry-government coordination in building new industries was not present in the post-war U.S., as it was in Japan. Further, with a history of rapid technological development and a political system that extolled individual achievement and (outside of the defense establishment) frowned upon government involvement in private research, no analogue comparable to Japanese industry-government coodination emerged in this country.

Although cooperative research ventures could offer many advantages in the

national interest, there is a reluctance to form them, it is claimed, because of concerns about antitrust law violations. In response to this concern, during the 97th and 98th Congresses, a number of bills have been introduced which, if enacted, would "clarify" the antitrust laws to make it clear that research joint ventures in and of themselves do not offend antitrust doctrine. Supporting the need for such legislation are those who believe that the threat of private antitrust litigation (and the potential for treble damages and extended and costly litigation, even if successful) has a chilling effect on research joint ventures. By extension, the advocates of clarification contend that joint research activity is societally valuable as a means of promoting internationally competitive high-tech joint research for U.S. firms, such as that conducted in Japan, and should be legislatively encouraged.

Opposing "clarification" are those who believe that, as now written and interpreted, the antitrust laws provide ample latitude for research joint ventures, and that "clarification" could provide the potential for abuse.

II. CONCLUSIONS AND RECOMMENDATIONS

On the basis of these hearings the Subcommittees have concluded that the Japanese successes in technology development and international competition are the result of many factors, including government policies, the workforce, management styles, and Japanese national goals. Factors involving government policies which are significant are:

- effective government sponsored cooperative research in many areas including semiconductors and computers. The government-sponsored ICOT program to develop a Fifth Generation Computer is a prime example of the central role that cooperative research will play in Japan during the remainder of the decade,

- government-assisted programs to promote effective diffusion of technology throughout their industry,

- favorable and cooperative relationship among labor, business and government,

- capability to achieve consensus across labor, business, government and academia on many issues,

- commitment to long-range planning objectives in spite of short-range failures,

- effective use of tax incentives to encourage exports,

- effective use of low interest loans and loan guarantees to promote selected industries,

- waiver of antitrust laws to promote success in selected industries,

- capability to adjust policies to address specific needs of selected industries,

With respect to U.S. responses using research and development joint ventures, the Subcommittees have concluded that our antitrust laws do create a barrier to cooperative research. Although in terms of strict legal interpretation this barrier may be only a perception, the resulting chilling effect is real because of the uncertainty that exists given the lack of definitive case law in this area.

To address the decline in international competitiveness being experienced by the United States particularly in high-technology industries, the Subcommittees recommend that Congress consider legislation to stimulate and encourage more effective utilization of our national research resources through joint research and569 development. Specifically, the Subcommittees recommend that this legislation include provisions to provide for immunity for qualifying ventures and reduction of treble damages in all lawsuites involving research and development joint ventures.

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III. HEARING WITNESSES

The witnesses who testified before the Subcommittees to address the issue of Japanese technological advances and possible U.S. responses through research joint ventures represented the current and previous Administration, the academic community, attorneys involved in antitrust law, and the private sector including large and small business firms. Also included were representatives from two ongoing research joint ventures, an industry joint research institute, a Member of Congress, and a representative from the Japan Productivity Center. The witness list follows:

June 29, 1983

Panel 1

Admiral Bobby R. Inman, President, Microelectronics and Computer Technology Corporation (MCC)

Dr. Harvey Brooks, Benjamin Peirce Professor of Technology and Public Policy, Harvard University

Mr. John Lacey, Executive Vice President, Technology and Planning, Control Data Corporation

Mr. Erich Bloch, Vice President, IBM Corporation and Chairman, Semiconductor Research Corporation (SRC)

Panel 2

Mr. Allan I. Mendelowitz, Associate Director, United States General Accountign Office

Dr. John Zysman, Director, Berkeley Roundtable on the International Economy (BRIE), Associate Professor of Political Science, University of California, Berkeley

Mr. Joji Arai, Director, Japan Productivity Center

Panel 3

Dr. Edward A. Feigenbaum, Professor of Computer Science, Stanford University

Dr. Robert S. Cooper, Director, Defense Advanced Research Projects Agency (DARPA)

June 30, 1983

Ed Zschau, a Representative in Congress from the State of California

Panel 1

William F. Baxter, Esq., Assistant Attorney General, Antitrust Division, U.. S. Department of Justice

Ky P. Ewing, Jr., Esq., Partner, Vinson and Elkins and former Deputy Assistant Attorney General, Antitrust Division, U. S. Department of Justice

Dr. D. Bruce Merrifield, Assistant Secretary of Commerce for Productivity, Technology and Innovation, U. S. Department of Commerce

Dr. Jordan J. Baruch, Consultant and former Assistant Secretary of Commerce for Science and Technology

Panel 2

Dr. James F. Mathis, Vice President, Science and Technology, Exxon Corporation and Chairman, Chemical Industry Institute of Toxicology (CIIT)

Panel 3

Steven J. Olsen, Esq., Associate General Counsel, Control Data Corporation

Joseph F. Brodley, Esq., Boston University School of Law

Gerald Sobel, Esq., Partner, Kaye, Scholer, Freiman, Hays and Handler

Alvin M. Stein, Esq., Parker, Chapin, Flattan and Klimpl

Douglas H. Ginsburg, Esq., Professor of Law, Harvard Law School

IV. MAJOR ISSUES ADDRESSED IN THE HEARING

This section presents the major issues that emerged during the hearings along with excerpts of witness testimony relating to these issues.[1] The issues ranged from aspects of Japanese industrial policy contributing to technological advances to details of various legislative proposals that would promote enhanced joint research ventures in the United States.

Role of Japanese Government in Promoting R&D

Through a combination of policy instruments, including the authority to exempt certain industries from the nation's antitrust laws, Japan's Ministry of International Trade and Industry (MITI) has played an influential role in promoting joint research and development.

The policy instruments used by the Japanese government to promote technology are varied and often tailored to meet the needs of specific industries. As the nation has progressed from its post-war recovery period, when the government's principle function was to nurture and protect young industry, to the present, its national requirements have changed and so have its policy instruments. Today, much of Japanese government policy is in the form of incentives designed to accomplish specific technological goals.

MITI has been successful in organizing large-scale R&D efforts. During the 1970s, the most successful of these was MITI's very large-scale integrated (VLSI) circuit program -- a program, in part, intended to provide Nippon Telephone and Telegraph Corporation (NTT), the public communications monopoly, with integrated circuits possessing large-scale memory capability.

MITI funding for the research effort amounted to better than 41% of the total cost of the venture. The success of the effort is evidenced by the more than 1,000 patents that were developed during the five year life of the project. More significantly, by the end of 1982, Japanese firms held 66% of the world market for the then state-of-the-art 64K RAM microchip. This percentage is to be compared with 1978 when Japan enjoyed only 38% of worldwide sales in microchips and U.S. companies could claim the rest.

In addressing the question of Japanese government support of R&D, Mr. Mendelowitz stated:

"The Japanese government, through its industrial policies, reduces the risks inherent in high technology research and development and makes investment in this area more attractive to industry. The government, directly or through government banks (e.g., the Japan Development Bank) provides seed money for various industry research and development projects defined to be within the parameters of national goals." (67-68)

"In addition to financial assistance, government support also comes in the form

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[1]The record of the hearings is publication number 45 of the Committee on Science and Technology, 98th Congress. The number in parentheses following quotes are numbers from the hearings record on which the quote appears.

of waivers from the anti-monopoly law of Japan for approved joint activities. Under the 1971 and 1978 temporary laws promoting the electronics and machineries industries, MITI was given the authority to exempt certain activities from the anti-monopoly law." (68)

"Another form of assistance is the use of tax deductions, credits, and special depreciation allowances to reduce the cost of development and diffusion of high technology products. Tax credits of up to 10 percent of corporate taxes are available for investment in new R&D facilities and equipment. Accelerated depreciation is allowed for facilities used to produce technologies approved by MITI. Other special depreciation allowances are available for certain machinery and equipment which embodies advanced technologies. Deductions from taxable income are permitted for incomes received from the export of technologies or technical services." (68-69)

Additional forms of Japanese government support were described by Dr. Zysman:

"When steel was a rapidly expanding sector in Japan, authorities were concerned that only the most efficient plants be built. Consequently, the entry of new plants to the market was regulated, each firm waiting in line to build plants to assure that growing demand did not generate a multitude of small scale and inefficient facilities. Something similar was at work in the urging from MITI to machine tool producers to specialize in specific applications. Finally, government-established cartels limit the risks of overly rapid expansion and excessive competition by regulating oversupply when domestic demand drops or expansion is too rapid. This system of controlled competition -- a phrase we developed in English only to discover it was also used by the Japanese themselves -- does not have a universal set of unchanging rules, but rather the rules must be clarified sector by sector, and they change over time. The purpose of the system has been to create enduring advantage in the market." (87)

The most significant research currently being supported by the Japanese government is the Fifth Generation Computer" project.

Dr. Feigenbaum described the Fifth Generation Computer as:

"The hallmark of the 5th Generation in the slogan coined by the Japanese, is the use to which the computer will be put. The 5th Generation computers will be engines for artificial intelligence not merely for traditional calculation or data processing. In artificial intelligence, the aim is to program computers to reason using knowledge. Thus, the 5th Generation reflects the Japanese view that in the 1980's we will all be making the transition from machines that calculate to machines that reason, and that this transition will be extremely important in human affairs and will open up a vast new market in information processing. The Japanese have a slogan for that too. They call it the knowledge industry. The Japanese view knowledge as the new wealth of nations, similar to oil, natural resources and agriculture." (116-117)

The current plan is for MITI to pay for all costs during the first three years with industry absorbing half of the cost in the succeeding seven years of the project.

"To implement its strategy, MITI and the major companies of the computer in-

dustry of Japan have established a central national institute, the Institute for New Generation Computing Technology (ICOT), and parallel proprietary laboratories in each of the companies. Leadership for ICOT came from the MITI Electrotechnical Laboratory and from NTT -- Japan Telephone and Telegraph Company. The participating companies are: Fujitsu, Hitachi, Nippon Electric Corporation, NTT, Matsushita, Mitsubishi, Oki, Sharp, and Toshiba. Each company contributed five young scientists, the "best and the brightest", according to ICOT's Director Fuchi." (117)

Other Factors Contributing to Japanese Success

It is claimed that Japan owes much of its industrial success to the so-called practice of "targeting". As Mr. Lacey described:

"The targeting process has been straightforward and very well executed. Japan imports a base technology from the West, enhances it through the vehicle of government sponsored cooperative R&D -- then protects the industry from foreign competition in its home market, which, of course, is the fastest growing and second largest market in the world. After gaining experience, economies of scale and consequent cost parity at home, they move out into the world market to further increase production volumes and reduce unit costs. They then use that cost advantage to improve the quality of their product, and eventually they are able to sell a better product at lower prices and at profit margins which are acceptable to them in the context of the Japanese economic system. The result for them is market dominance." (28)

Mr. Mendelowitz indicated that the key factor in Japan's successful implementation of policy was their "flexibility".

"This flexibility is evident in the way the Government of Japan has changed goals and policy instruments in response to changing domestic and international economic and political circumstances." (62)

"In the early postwar period, Japan marshalled a large array of industrial policy tools which enabled the government to strongly influence the rate and direction of economic growth. These tools included:

-- strict foreign exchange controls;

-- commercial policies which gave incentives to exports and restricted imports; and

-- controls over foreign investment and the acquisition of technology" (64)

"Monetary and fiscal policies reinforced the effectiveness of these tools in a number of ways, primarily by:

-- keeping interest rates low, thereby lowering the cost of investment;

-- maintaining a balanced budget and government spending at a modest share of gross national product; and

-- administering a tax system which favored savings and investment." (65)

He noted that this flexibility is characterized by:

"Japan's ability to tailor different policies to different industries at different points in time. This has been accompanied by changes in the government's influence over the direction of growth. Early government tools such as control over foreign exchange allocations, have been replaced by programs which most often rely on incentives. Within this context, government support for individual industries has been tailored to meet the specific needs and objectives of a given industry." (77)

Dr. Harvey Brooks described other factors contributing to Japan's success:

"Another major element in Japanese success has been skill in exploiting learning curves and economies of scale. Their success in exports has fed on itself, enabling Japan, starting from the existing state of the art, to traverse the learning curve much more rapidly than its competitors, thus achieving progressively greater cost advantages as the market expanded, and generating more surplus to feed back into product and process innovation which further reinforced the advantage." (16-17)

"There is also some evidence to suggest that the Japanese have been more tolerant of initial failures than U.S. firms. Almost all of the well publicized Japanese successes -- in automobiles, portable and color TV, video recorders, VLSI, fine ceramics, computers -- have been preceded by expensive failures, with success occurring at the second try. In the case of video recording, for example, American companies gave up after initial models failed in the market, while the Japanese companies persisted in further design refinements until their efforts met with success in the market." (17-18)

"There is considerable evidence that some part of the Japanese competitive advantage derives from the educational level of the work force, and from the management of the work force in such a way as to continually enhance its capabilities. The science and mathematics performance of high school graduates in Japan is far superior to that of their counterparts in the United States. A higher percentage of university graduates study engineering, and Japan graduates absolutely more engineers than the United States, despite a smaller population." (19-20)

Mr. Joji Arai explained the rationale behind the favorable relationship that developed between labor and management and the successful philosophies that developed from this relationship.

"The new leaders advocated the need to collaborate with management in expanding the size of the pie without a fierce confrontation over the percentage share to which they were entitled." (93)

"The emerging rapport between business and labor prompted many Japanese companies to establish a new philosophy with respect to corporate goals.

1. A company serves people who work for it.

2. A company serves people who buy their products and services.

"To accomplish goal number one, companies were to offer lifetime employment to their people which required development of long term strategic plans and investment programs because they cannot layoff or discharge employees in order to retain profit in time of a declining economy." (98)

"Corporate goal number two required companies never to place defective products on the market or give unsatisfactory service. Total quality control (otherwise known as corporate wide quality control) required the commitment of chief executive officers as well as lowest ranking men on the shop floor. Rather than inspection oriented quality control, Japanese opted to develop new product designing and process oriented quality control systems so that the first time products come off the line they are without defects. In the process, Japanese discovered that a serious commitment to quality improvement actually resulted in a reduction of costs and an expansion of the market share. This is contrary to the traditional concept held by many old time American managers that quality investment diverts capital necessary for production." (99)

Successful diffusion of technology in Japanese industry was identified by both Dr. Zysman and Mr. Mendelowitz.

MITI and other government agencies have shown great skill in tailoring government assistance to the needs of the industry in question. To promote the nation's computer industry, the government established a leasing program funded by loans from the Japanese Development Bank, so that Japanese companies could compete with IBM. In a similar vein, the Japan Robot Leasing Company, Ltd. (JAROL) was established in 1980 to lease robots to small and medium sized firms. JAROL received no initial capital from the government, however, 60% of its operating funds are derived from the Japanese Development Bank in the form of low interest loans.

Mr. Mendelowitz stated that:

"In the case of robotics... the Government intervened to assist primarily in the infusion of robotics in the economy through tax credits, government credit and the creation of a leasing company to facilitate the diffusion of robotics to small- and medium-sized firms."

Dr. Zysman observed:

"...these policies have also served to help diffuse the technologies not simply to other uses but in many cases to the specific producers. That is, you have a situation in which not all producers are equally advanced in a given technology, and the joint programs, in many cases, serve to diffuse the technology among the producers in Japan which creates, in fact, conditions for quite intense competition." (79)

Need for Cooperative Research in the U.S.

Dr. Bruce Merrifield indicated that other countries are utilizing their resources more effectively through cooperative research and by removing barriers to cooperative research and development.

"Of greater significance to us currently is that Japanese antitrust law did not prohibit firms from conducting collaborative research and development in MITI targeted areas such as computers, microelectronics, electronic instruments, lasers, optical communication, robots, and aerospace." (198)

"Similarly, French antitrust law did not deter French firms from conducting massive joint research and development projects in such areas as aerospace, telecommunications, microelectronics, energy, and conservation equipment. West German firms also have not been inhibited by antitrust restrictions in conducting joint research and development in computers, microelectronics, and electronic office equipment." (198)

"Further, the European Economic Community has exempted several collaborative joint research agreements of individual member countries from the antitrust restrictions of Article 85 of its Treaty. For example, the European consortium Airbus Industrie led by France and West Germany has been able to conduct joint design, testing, and manufacturing, which assisted them in capturing roughly a quarter of the jet aircraft market in 1981." (198-199)

Dr. Jordan Baruch stressed the need for a higher degree of cooperation among industry, academia and government.

"We are faced with the kind of challenge that may finally break the paralysis that has gripped this country for many years. While the leaders in Japan have rallied industry, government and academe behind a national purpose aimed at making their country an economic leader in the western world, we have clung to the simplistic notion that if government, academe and industry all pull in the directions dictated by their own self-interest everything will come out alright." (213)

Impediments to the Formation of U.S. Research Joint Ventures

Mr. John Lacey described his views on why cooperative research is not more prevalent in the United States.

"There are at least two very important reasons: The first is our business culture. It evolved in an environment of a huge and expanding domestic market, in which competition for most U.S. corporations was mainly with other U.S. companies. It emphasizes short-term investment horizons and it fosters a misplaced view of what is involved in maintaining a proprietary position." (33)

"The second and more important reason for the lack of cooperation in U.S. research and development, however, is the widespread fear of inadvertently violating our century-old antitrust laws, even though they ignore current economic realities and promote inefficiency in the name of antitrust enforcement. Many companies are deeply concerned that the Justice Department or the courts will interpret "cooperation" to mean "conspiracy" -- even in R&D -- and that they will therefore be exposed to large treble damages awards." (34)

"Even though research consortia are typically completely lawful, the uncertainties in the interpretation and application of U.S. antitrust laws are a major obstacle to pooling resources in research and development, very little official guidance exists as to what constitutes a lawfully-structured joint R&D venture or what conduct will ultimately be considered lawful by the courts."

(34)

Supporting the notion that our antitrust laws create a "chilling effect" on potential joint research, Mr. Steven Olson commented:

"The confusion under current law is compounded by the fact that, even if the Justice Department or FTC should agree that an R&D venture passes muster, there are a lot of private lawyers ready and willing to disagree. For example, as I'm sure many of you are aware, a San Francisco antitrust lawyer who generally represents treble-damage plaintiffs -- Joseph Alioto -- has written each MCC shareholder stating flat-out that he thinks MCC is illegal. Is it any wonder that business persons are deterred from joint research activities?" (264-265)

"Instead, we should be looking for ways to achieve the integrated, high volume operations we need without sacrificing the diversity we value. Yet, the antitrust laws and those who enforce them seem to remain firm in their bias against collaboration among competitors. The Assistant Attorney General rails against executives even comparing golf scores, and the Supreme Court, in Texas Industries, reaffirms the rule that antitrust defendants are not entitled to contribution from their co-conspirators. Because the rule, by definition, applies almost entirely to multi-party cases, and because the result is to hold the spector of enormous damages over the head of small or minor participants, the effect is to deter very strongly any collaboration among competitors, particularly the small and financially weak." (269)

Dr. Merrifield commented on this issue to the effect that:

"In this regard, U.S. firms have consistently expressed the view that they are handicapped in competing in international markets because our antitrust laws inhibit joint research and development. U.S. firms say they are hesitant to invest heavily in joint research and development projects because of the high risk of treble damages and criminal sanctions under existing antitrust law." (202)

"The high risk perceived by U.S. companies in conducting joint research and development has persisted despite the Department of Justice's Antitrust Guide Concerning Research Joint Ventures, which attempts to clarify how the antitrust laws apply to a given set of facts. For one thing, guidelines by their nature have to be somewhat ambiguous to allow room for flexibility of enforcement policies which can vary from one Administration to the next." (203)

Elimination of Triple Damages

Several witnesses remarked that triple damage awards as required currently under antitrust law were too punitive a remedy for cases involving only joint research. For example, Mr. Ewing stated:

"If a cooperative research and development venture, structured in accordance with the principles of the Antitrust Guide Concerning Research Joint Ventures is, on balance, procompetitive, why should businessmen be deterred by antitrust fears? The answer lies in the risk of costly litigation. At present, in order to encourage private attorneys general to supplement Sherman Act enforcement by the government, we provide a treble-damage bounty. ...this stacking of the deck, as it were, in favor of litigation does not now distinguish between a

suit against a covert horizontal price-fixing cartel and an open joint research-and-development effort that leaves marketing of the resulting innovative products up to the individual (and unilateral) efforts of each participant. (183)

Mr. Baxter observed that:

"The threat of mandatory treble damages is a necessary and appropriate deterrent to conduct that is clearly anticompetitive and is carried out in secret, as in the case of price fixing among competitors. Such a punitive damage remedy is counterproductive, however, when it applies to conduct that can be procompetitive and is carried out in the open. Because treble damages greatly increase the cost associated with the risk that some court might incorrectly condemn a particular procompetitive practice, the remedy can inhibit a wide variety of procompetitive arrangements. (160)

On the other hand, Mr. Alvin Stein observed that elimination of treble damage awards may eliminate private action as a means of antitrust law enforcement.

"Without the potential for treble damage recoveries, private enforcement of antitrust law will not simply be discouraged, but may well become extinct. In fact, even under current laws, the number of private parties willing to undertake this burden has decreased as the result of the overwhelming cost and duration of most antitrust litigation." (322)

Self-Certification vs Dept. of Justice Certification

Mr. Baxter indicated disfavor with the concept of Dept. of Justice certification for research joint ventures.

"Certain of the bills currently pending before Congress would require the Attorney General to certify that applicant joint R&D ventures satisfy the criteria established under the bills. In its role as certifier, the Department would be required to oversee the structure and conduct of all joint R&D ventures, regardless of their anticompetitive potential. This would unnecessarily interfere with numerous innocuous joint ventures. Furthermore, it would entail the expenditure of substantial Departmental resources that could be better spent investigating and presecuting anticompetitive behavior." (163)

Mr. Olson expressed a similar negative view toward Dept. of Justice certification but spoke in favor of a self-certification approach.

"This approach is preferable over that contained in those bills which would require any venture to be "certified" by the Justice Department. We do not think it either necessary or desirable that another bureaucracy be created to solve this problem. We would prefer a law that the private sector could itself understand and apply. Further, to be successful, such ventures must remain fluid, with strategic decisions constantly reviewed and redirected in light of experience provided by the process. A rigid certificate authorizing certain described venture activities is wholly inappropriate to this environment." (272)

Mandatory Licensing

Several witnesses expressed views that the concept of requiring licensing of technology developed by research joint ventures was not desirable because it created a disincentive for the formation of the venture and it could even be anticompetitive. As stated by Mr. Baxter:

"The mandatory licensing provisions contained in the bills, moreover, would diminish existing incentives for innovation. As I explained earlier, the system of exclusive rights under the intellectual property laws provides the means by which inventors and innovators can obtain a financial reward for their R&D efforts and thereby establish a strong incentive to invest in R&D. The provisions for mandatory licensing in the bills would be a de facto repeal of the intellectual property laws and would in the long run reduce the flow of private resources into R&D." (165)

"Furthermore, when firms know that they will have access to their competitors' successful R&D efforts, their own incentive to invest in R&D may be reduced significantly. They may choose instead to "free ride" on the efforts of other firms. While the ride would not be entirely "free" because of the required payment of a "reasonable" royalty, the competitors will be assured of access to the invention, and access is often critical." (165)

Mr. Douglas Ginsburg expressed his concerns on mandatory licensing as follows:

"The same concern appears to underlie the compulsory licensing requirements, under which jointly developed innovations must be licensed to all comers on a non-discriminatory basis after a certain number of years -- three or six depending upon the bill. This provision strengthens the incentive provided by the mandatory sharing provisions for a firm not to participate in a research joint venture until it is a proven success. Then the non-participating firm could choose between paying a risk premium to join, or waiting as little as three years to get access to the technology, and can do whichever seems more advantageous at the time. It further diminishes the rewards that those firms that do participate will be allowed to reap for their efforts. And it puts joint research on a disadvantageous footing compared to independent research." (333-334)

Venture Size as Related to Antitrust Concerns

A concern expressed by Mr. Baxter related to too large a percent of an industry being represented in any research joint venture.

"The anticompetitive problems with R&D joint ventures lie not in the possible success of the ventures displacing other companies but rather in two aspects of activity. One is the loss of competition in the process of innovation in the industry. If too many of the companies in the industry are in the same joint venture, one loses rivalry in the process of innovation and we should always desire to preserve rivalry in the process of innovation. We should be shooting to have five or six or seven joint ventures in industries, not one or two. That is one of the competitive problems.

The other competitive problem that arises is if in a tightly structured industry where there are only half a dozen, eight, ten firms, if a large fraction of them get in one of these groups, the opportunity for them constantly to be in touch with one another to communicate with one another may facilitate anti-

competitive collusion today and quite without regard to the success or failure of the venture, back in the marketing and distribution in which those companies currently compete in their own markets." (238)

Mr. Baxter commented that if almost all of an industry is in one R&D joint venture, then:

"Nobody has any incentive to increase the budget. Everybody has every incentive to reduce the budget of the industrywide joint venture. There is no possibility of getting ahead of your competitors because everybody is going to be entitled to whatever the joint venture produces. There is no possibility of falling behind because you are going to be entitled to whatever is produced. An industrywide joint venture is tantamount to repeal of the intellectual property laws with respect to that industry and we should resist that very, very strongly.

"But when small subsets of an industry wish to get together and realize scale economies, that should be permitted." (227)

Attorney's Fees to Successful Defendant

Mr. Ky Ewing proposed that attorney's fees be paid to successful defendants in antitrust cases. The main objective of this concept would be to discourage frivolous suits.

"The additional refinement I would add would be to award attorney's fees and court costs to defendants who are successful in defending against a plaintiff's per se antitrust claims, at least in cases involving research and development joint ventures and in cases involving arrangements to create and transfer intellectual property." (167)

"If we want to change the incentives, it is not sufficient merely to legislate about an outcome of the suit. We must also deal with the incentives related to the plaintiff's initial claims, which are what control discovery and much of the burden of litigation.

"Plaintiffs should be left free to allege covert per se offenses compensable with treble damages, but only if they are willing to risk having to pay the defendant's lawyers and court costs if the allegations are unfounded. This change alone will, in my judgment, significantly reduce the risk to businessmen of unfounded litigation." (167-168)

Mr. Brodley expressed a negative view with respect to payment of attorney's fees to successful defendants.

"...the several proposals to make attorney's fees payable by the plaintiff under certain circumstances. All of these proposals are undesirable because they undertake basic change in the remedial structure of the antitrust laws without assurance that such change will solve the specific problem to which the bills are addressed." (286)

Rule of Reason Applied To Antitrust Cases

Several witnesses expressed views that antitrust cases for research joint

ventures should be judged using the "rule of reason" approach by the courts rather than a "per se" rule.

For example, Mr. Ewing noted that:

"Thus, the joint venture businessman today faces the risks of litigation, because of a bias toward it in the system. Also, that same businessman, if advised by sophisticated antitrust lawyers, must also appreciate that an astute plaintiff may well charge him with per se violations, in the hope of persuading a judge to use per se labels to condemn his venture, rather than engaging in a rule-of-reason analysis that would sort out the ultimate balance between some restraining effects and other precompetitive effects." (183-184)

Mr. Baxter described the Administration proposal on this issue.

"The Administration's approach to solving this problem would clarify that joint R&D may not be condemned as per se illegal under the antitrust laws. In addition, for joint R&D ventures that are fully disclosed to the government, the proposal would provide immunity from all private antitrust suits and from government antitrust damage suits. If a joint R&D venture proved to be anticompetitive, the government could still challenge it under the current antitrust standard. The Administration's approach thereby would eliminate any possibility that antitrust uncertainty might deter procompetitive joint venture activity, while retaining adequate safeguards against anticompetitive joint R&D activity." (159)

V. SUMMARY OF WITNESSES TESTIMONY

The record of the hearings is publication number 45 of the Committee on Science and Technology, 98th Congress. The following is a summary of each witness' testimony. Number in parentheses following quotes are page numbers from the hearings record on which the quote appears.

Admiral Bobby R. Inman. Admiral Inman described the research joint venture known as MCC.

"The Microelectronics and Computer Technology Corporation, (MCC), is a research and development venture owned by a number of companies in the United States computer, electronic and semiconductor industries. Participating companies so far include Advanced Micro Devices, Allied Corporation, Control Data, Digital Equipment Corporation, Harris, Honeywell, Martin Marietta, Mostek, Motorola, National Semiconductor, NCR, RCA, and Sperry." (7)

He then described the mission of MCC.

"The mission of MCC is to provide cooperative research and applied technology, to make the most of our scarce human and capital resources -- to preserve the United States competitive position in the microelectronics and computer industries -- and to foster competition as each participant uses the results of MCC research to derive products of its own conception for markets of its own choice." (7)

Admiral Inman defined why he thought the MCC approach was needed.

"MCC will develop a broad base of fundamental technologies and undertake projects that will go significantly beyond current state-of-the-art. Development will zero-in on areas where the investment is so large, or the risk so great, or the critical skills so short -- that a shared effort is the only practical approach." (7)

He also explained the benefits to the MCC participants which will include:

"An expanded scope of R&D to include projects that individual companies could not or would not undertake alone due to the costs and risks involved;

A reduction in the wasteful duplication of R&D;

A better definition of R&D needs and pitfalls; and

A more efficient utilization of scarce scientific and technical talent." (8)

Finally, Admiral Inman explained the need for research joint ventures especially in the area of microelectronics and computers. "Microelectronics and computers in twenty-five short years have moved from a specialty to a necessity in the emerging information age. What steel and power were to industrial America, microcomputers are to knowledge-based America. Jobs, profits, the balance of payments and the national defense are profoundly affected by the rise and fall in the fortunes of the microelectronics and

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computer industries. These industries are gripped with a multiplicity of threats, internally by shortages of capital, skilled personnel and time -- and externally by government supported campaigns from Japan and Europe to replace America as the world leader in microelectronics and computers." (8-9)

"MCC is a unique -- made-in-America response -- a private sector initiative -- a means to avoid wasteful duplication of R&D among the high technology firms in the industry -- a tool to enhance competition and our quality of life." (9)

Harvey Brooks. Dr. Brooks indicated that two points of view exist relating to the success realized by the Japanese in penetrating U.S. markets. "On the one hand, are those who feel that Japanese successes owe largely to the fact that they do not "play fair" and they have taken unfair advantage of the relative openness of the U.S. economy and ideological devotion to free trade. In this view the Japanese market is closed, particularly to American innovative products, while the American market is open to invasion by Japanese innovations. The prime objective of these critics of U.S. policy is to change the ground rules so as to achieve a "level playing field", using Japanese dependence on access to the huge U.S. market as the tool with which to force Japanese policy to conform to our view of what constitutes fair competition. (13)

"On the other hand, there are those who feel that the loss of U.S. competitiveness to the Japanese is primarily of our own making, and results from a combination of short sighted U.S. management in our major industries and fiscal, tax, regulatory, and other public policies which hamper the ability of our domestic industries to compete in international markets. They point out that historically U.S. economic policy has been largely oriented towards domestic competition rather than international trade, and we have seldom considered the trade implications of either our management practices or our public policies towards business." (14)

Dr. Brooks then set forth a number of general observations on the sources of Japanese success, and then made several points on our own policies and sources of potential strength and weaknesses in the arena of international competition.

"In what follows I will set down a number of tentative propositions which I hope can provide a useful setting for our discussion. 1) It would be wrong to ascribe Japanese competitive success in high technology to R&D alone, nor to expect that the U.S. lag could be overcome by working exclusively, or even largely, on the R&D component of the total innovative process in isolation from other aspects. The U.S. still has the largest and most diversified R&D establishment in the world, and we still lead the world in the creation of industrial innovations, though not necessarily in their successful commercialization." (15)

"2) Some observers believe that the Japanese derive much greater commercial pay-off from their R&D dollars than does the U.S." He went on to say that "One possible source of Japanese research productivity is the avoidance of wasteful and inefficient competition in R&D." (16)

"3) The Japanese economy is relatively weak and inefficient on the domestic distribution side, with a very weak system of consumer finance and credit. In other words, capital has flowed to production rather than to consumption in Japan, and this on top of a much higher personal savings rate. Japanese

success in the American consumer market could be described as a product of the successful marriage of efficient Japanese production to the highly skilled and efficient American distribution system, including, of course, consumer credit financing." (16)

"4) Another major element in Japanese success has been skill in exploiting learning curves and economies of scale. Their success in exports has fed on itself, enabling Japan, starting from the existing state of the art, to traverse the learning curve much more rapidly than its competitors, thus achieving progressively greater cost advantages as the market expanded, and generating more surplus to feed back into product and process innovation which further reinforced the advantage." (16-17)

"5) Although Japanese success in recent years has been based on the adaptation of western, mainly American, technology, and on the capacity to commercialize it more rapidly than its competitors, it would be wrong to conclude from this that the Japanese are mere imitators who, once they have attained to the world state-of-the-art in a field, will not continue to move forward the frontiers of technology." (17)

"6) There is also some evidence to suggest that the Japanese have been more tolerant of initial failures than U.S. firms. Almost all of the well publicized Japanese successes -- in automobiles, portable and color TV, video recorders, VLSI, fine ceramics, computers -- have been preceded by expensive failures, with success occurring at the second try. In the case of video recording, for example, American companies gave up after initial models failed in the market, while the Japanese companies persisted in further design refinements until their efforts met with success in the market." (17-18)

"7) Successful innovation, especially in high technology fields, depends upon a very subtle and elusive blend between cooperation and competition. Neither a model of pure competition nor one of aggregation of R&D efforts into "critical size" units seems to provide an adequate explanation of innovative success." (18)

"8) There is considerable evidence that some part of the Japanese competitive advantage derives from the educational level of the work force, and from the management of the work force in such a way as to continually enhance its capabilities. The science and mathematics performance of high school graduates in Japan is far superior to that of their counterparts in the United States. A higher percentage of university graduates study engineering, and Japan graduates absolutely more engineers than the United States, despite a smaller population." (19)

John Lacey. Mr. Lacey commented on the declining position of the United States in world technology. "Our country's once strong international position in technology has been steadily eroding, while other nations have devised ways to accelerate their development and application of advanced technology. Our foreign competitors have greatly expanded R&D spending while they have minimized needless R&D duplication. They have dramatically increased their supply of trained scientific and technical personnel, and they have reduced the cost of capital to their key industries." (27)

He made specific reference to the loss in leadership in a portion of the micro-

electronics industry. "In the last few years, the U.S. position in microelectronics has gone from one of unquestioned and seemingly unassailable leadership to one of considerable vulnerability. The experience of being in second place in worldwide shipments of a particular advanced microelectronic component -- the 64 thousand-bit random access memory chip -- has occurred for the first time." (27)

Mr. Lacey next described how the process of "targeting" as practiced by Japan has resulted in competitive advantage.

"The targeting process has been straightforward and very well executed. Japan imports a base technology from the West, enhances it through the vehicle of government sponsored cooperative R&D -- then protects the industry from foreign competition in its home market, which, of course, is the fastest growing and second largest market in the world. After gaining experience, economies of scale and consequent cost parity at home, they move out into the world market to further increase production volumes and reduce unit costs. They then use that cost advantage to improve the quality of their product, and eventually they are able to sell a better product at lower prices and at profit margins which are acceptable to them in the context of the Japanese economic system. The result for them is market dominance. The result for the U.S. firms, at best, is reduced profits, fewer jobs and reduced ability to invest in new competitive technologies." (28)

Mr. Lacey addressed the question as to why technological cooperation is not more prevalent among our high technology industries.

"There are at least two very important reasons: The first is our business culture. It evolved in an environment of a huge and expanding domestic market, in which competition for most U.S. corporations was mainly with other U.S. companies. It emphasizes short-term investment horizons and it fosters a misplaced view of what is involved in maintaining a proprietary position." (33)

"The second and more important reason for the lack of cooperation in U.S. research and development, however, is the widespread fear of inadvertently violating our century-old antitrust laws, even though they ignore current economic realities and promote inefficiency in the name of antitrust enforcement. Many companies are deeply concerned that the Justice Department or the courts will interpret "cooperation" to mean "conspiracy" -- even in R&D -- and that they will therefore be exposed to large treble damages awards." (34)

"Even though research consortia are typically completely lawful, the uncertainties in the interpretation and application of U.S. antitrust laws are a major obstacle to pooling resources in research and development, very little official guidance exists as to what constitutes a lawfully-structured joint R&D venture or what conduct will ultimately be considered lawful by the courts." (34)

"Thus, participants in a cooperative R&D venture are forever under the threat of lawsuits which are counterproductive both in terms of legal costs and effort diverted from research." (34)

"It is time to correct this problem. In order to achieve widespread technology cooperation, we need a change in the tenor of current laws -- from laws that

sometimes permit it -- to legislation that encourages it." (35)

Erich Bloch, Mr. Bloch, representing the Semiconductor Industry Association (SIA) and the Semiconductor Research Cooperative (SRC), a subsidiary of the SIA devoted to cooperative research, described the organization and activities of the Semiconductor Research Cooperative. At present, SRC has limited its activities to pure research at private and state universities.

"To date, 18 companies have joined this activity and another 12 companies have expressed great interest. The companies range from very large (Motorola, IBM, GE, Honeywell) to medium ones (CDC, DEC, Intel, AMD, H/P) to small ones (Silicon Systems, Monolithic Memories), to cite a representative sample. In 1983 the commitment exceeds 11 million dollars. At present, the SRC has entered into 50 contracts with 30 private and state universities. Some contracts are major research thrusts on a broad basis and provide for work that will be conducted over many years with major universities participating -- and at times cooperating -- among themselves. One hundred academic researchers and 125 graduate students are now supported by these contracts." (49-50)

Mr. Bloch presented his view of the semiconductor industry and the loss in world market share experienced by the United States over the past 5 years.

"The semiconductor industry has been in existence for only 30 years. But in this short time it has grown to a $15 billion worldwide industry. More important it is a basic industry, just as basic as steel, oil and chemicals were in the past. Its products are pervasive and are the foundation of other high technology sectors such as computers, telecommunications and instrumentation." (42-43)

"Up to five years ago, the semiconductor industry was primarily a U.S. industry, not only in innovation and new applications, but also in both demand and supply of products. By 1982, however, the U.S. semiconductor industry share of the worldwide market had eroded to 55%, while that of Japan increased to 35%. In 1983 further erosion of market share by U.S. companies is predicted." (43)

He went on to explain how Japanese policy helped the growth of their semiconductor industry.

"Japanese industry under MITI guidance received financial support from government agencies through favorable loans and research subsidies. In addition, pooling of engineers and scientists from industry and government has fostered growth in research and development. This has resulted in investment on a greater scale than the U.S. semiconductor industry could afford to do. This, despite the fact that the investment in capital and R&D by the U.S. semiconductor industry in 1982 was 14% and 9.8% respectively, compared to 7% and 3% by U.S. industry as a whole. Japan, however, is outspending the U.S. semiconductor companies in both of these areas: 20% in capital investment and 15% in R&D spending." (45)

Mr. Bloch indicated that in part to address this challenge, SRC is considering extending its mission into areas other than pure research.

"Specifically, the SRC is considering a pilot program of process definition and

advanced design for a four megabit memory chip. This could leapfrog the normal development cycle; bring together in one place the critical mass for such an effort; and demonstrate the manufacturability and reliability of such a device." (50-51)

Mr. Bloch proposed that Congress help the U.S. semiconductor industry, as well as other high technology industries by (a) assuring the continuation of the R&D tax credit beyond its 1986 expiration date; (b) liberalizing the credit for industry-funded university research; (c) clarifying and liberalizing the anti-trust laws to permit joint research efforts; and (d) taking cognizance of our technical skill shortages by allowing foreign students attending U.S. universities to enter the U.S. workforce. (52)

Allen J. Mendelowitz. Mr. Mendelowitz's testimony presented a summary of two reports prepared by the U.S. General Accounting Office: "Industrial Policy: Japan's Flexible Approach" (GAO/ID-82-32, June 23, 1982), and "Industrial Policy: Case Studies in the Japanese Experience" (GAO/ID-83-11, October 20, 1982). These reports trace the development of industrial policy in Japan since World War II and describe the changes in industrial policy goals and how monetary and fiscal policies have been structured to achieve these goals.

Mr. Mendelowitz commented that, "The single word that probably best characterizes Japanese industrial policy is the descriptive term flexibility. This flexibility is evidenced both in the type of objectives adopted as the goals of industrial policy and in the instruments used to achieve these goals." (59)

He noted that this flexibility is characterized by "Japan's ability to tailor different policies to different industries at different points in time. This has been accompanied by changes in the government's influence over the direction of growth. Early government tools such as control over foreign exchange allocations, have been replaced by programs which most often rely on incentives. Within this context, government support for indivual industries has been tailored to meet the specific needs and objectives of a given industry." (77)

"A significant aspect of Japan's industrial policy toward emerging industries lies in government support for the development of leading-edge technologies. Direct subsidies to joint industry government R&D projects and tax credits for research and development help to provide the resources to develop new technology. Recognizing that the contribution of new technology depends on how quickly and widely it spreads throughout the economy, the Japanese Government has also used preferential tax treatment, credit, and government supported leasing companies to encourage the diffusion of new technology." (78)

"In terms of objectives in the early post-war period, Japan set out to rebuild a war shattered economy which meant rebuilding basic industry. When basic industry was rebuilt industrial policy objectives centered on catching up with the technology of the West. Now that the Japanese economy has reached parity in a technological sense with the United States and Western Europe the objectives are in pushing out the frontier of knowledge and moving to an advanced technology-intensive and knowledge-intensive economy." (59)

Mr. Mendelowitz discussed three developing industries included in the GAO

study: aircraft, computers and robotics.

In the case of aircraft industry, the Japanese government assisted the civil aircraft industry by first promoting the development of the military industry through co-production agreements which provided necessary experience in aircraft production and assembly. After an unsuccessful attempt to promote the aircraft industry in the 60's, the government moved into support of participation in international joint research, development and production ventures. Currently, the Japanese aircraft companies are involved with the English (Rolls Royce) in the development of jet aircraft engines and they are 15 percent risk-sharing partners in the Boeing 767 program.

In the case of the computer industry, the Japanese are trying to push out the knowledge frontier by supporting with substantial funds a high-speed computer project and an artificial intelligence project.

In the case of robotics, the government intervened to assist primarily in the infusion of robotics in the economy through tax credits, rapid depreciation (over 50% in the first year) and the creation of a leasing company (JAROL) to facilitate the diffusion of robotics to small and medium-sized firms.

Mr. Mendelowitz discussed support of high-technology industries.

"The Japanese government, through its industrial policies, reduces the risks inherent in high technology research and development and makes investment in this area more attractive to industry. The government, directly or through government banks (e.g., the Japan Development Bank) provides seed money for various industry research and development projects defined to be within the parameters of national goals." (67-68)

"In addition to financial assistance, government support also comes in the form of waivers from the anti-monopoly law of Japan for approved joint activities. Under the 1971 and 1978 temporary laws promoting the electronics and machineries industries, MITI was given the authority to exempt certain activities from the anti-monopoly law." (68)

"Another form of assistance is the use of tax deductions, credits, and special depreciation allowances to reduce the cost of development and diffusion of high technology products. Tax credits of up to 10 percent of corporate taxes are available for investment in new R&D facilities and equipment. Accelerated depreciation is allowed for facilities used to produce technologies approved by MITI. Other special depreciation allowances are available for certain machinery and equipment which embodies advanced technologies. Deductions from taxable income are permitted for income received from the export of technologies or technical services." (68-69)

John Zysman. Dr. Zysman pointed out that joint research and development efforts in Japan serve several purposes.

"First of all, they serve to advance the state of the generic or basic technologies in Japan and in that process, at the same time to help specialize producers along certain types of product lines (such as) -- machines tools and in semiconductors.

"Second... these policies have also served to help diffuse the technologies not simply to other uses but in many cases the specific producers. That is you have a situation in which not all producers are equally advanced in a given technology and the joint programs, in many cases, serve to diffuse the technology among the producers in Japan which creates, in fact, conditions for quite intense competition.

Third, it tends to create standards. For example, many software languages and other kinds of devices that create amongst the Japanese a commonality of effort which focuses the efforts of the several firms along a single line. And fourth, it does diffuse this technology very actively to the users. It tends to try and create markets for these new technologies." (79)

Dr. Zysman explained the strong influence of MITI on industrial development in Japan.

"When steel was a rapidly expanding sector in Japan, authorities were concerned that only the most efficient plants be built. Consequently, the entry of new plants to the market was regulated, each firm waiting in line to build plants to assure that growing demand did not generate a multitude of small scale and inefficient facilities. Something similar was at work in the urgings from MITI to machine tool producers to specialize in specific applications. Finally, government-established cartels limit the risks of overly rapid expansion and excessive competition by regulating oversupply when domestic demand drops or expansion is too rapid. This system of controlled competition -- a phrase we developed in English only to discover it was also used by the Japanese themselves -- does not have a universal set of unchanging rules, but rather the rules must be clarified sector by sector, and they change over time. The purpose of the system has been to create enduring advantage in the market." (87)

Dr. Zysman gave another example of structured competition from the numerically controlled (NC) machine tool industry.

"An NC machine tool consists of a cutting device and a computer that controls it. In Japan, one major producer of controllers has emerged, while in the United States there is a competition among producers of machine tools based in part on differences in their controllers. The Japanese now compete in the application of these controllers to machine tools, permitting the one company -- Fujitsu Fanuc, with close ties to computer and semiconductor manufacturers -- to innovate in the controller technology. The competition has been structured." (90)

Joji Arai. Mr. Arai summarized the policy development in Japan since the 1950's that recognized that the past practice of producing a high volume of inexpensive goods had to be abandoned. "This thinking resulted in the government policy of promoting the rapid growth of heavy and chemical industries in the 1950's, and a transition of priority to industries' products with higher technological content such as ships, automobiles, electrical and electronic equipment in the 1960's. This was done through administrative guidance, tax benefits and low interest loans in the early stage of their development. The direct interference by the government, however, was usually limited to the initial stage of industrial development, and competition was encouraged in the open market after the development of generic technology by the joint efforts of

the public and private sectors." (93)

He also commented on the impact of labor movements in America and Germany. "The exposure triggered the emergence of moderate labor leaders who replaced the old timers in the movement who were pursuing the goal of establishing a proletarian society through class struggle. The new leaders advocated the need to collaborate with management in expanding the size of the pie without a fierce confrontation over the percentage share to which they were entitled." (93)

"The emerging rapport between business and labor prompted many Japanese companies to establish a new philosophy with respect to corporate goals.

1. A company serves people who work for it;

2. A company serves people who buy their products and services.

"To accomplish goal number one, companies were to offer lifetime employment to their people which required development of long term strategic plans and investment programs because they cannot lay off or discharge employees in order to retain profit in time of a declining economy." (98)

"Corporate goal number two required companies never to place defective products on the market or give unsatisfactory service. Total quality control (otherwise known as corporate wide quality control program) required the commitment of chief executive officers as well as lowest ranking men on the shop floor. Rather than inspection oriented quality control, Japanese opted to develop new product designing and process oriented quality control systems so that the first time products come off the line they are without defects. In the process, Japanese discovered that a serious commitment to quality improvement actually resulted in a reduction of costs and an expansion of the market share. This is contrary to the traditional concept held by many old time American managers that quality investment diverts capital necessary for production." (99)

In response to a question by Mr. Gore, Mr. Arai described the process by which industrial input to policy decisions is obtained as part of the Japanese concensus-building process.

"Well, essentially Japan is a driven society. It has no natural resources. It does not have the aggregate wealth that the United States has and this situation has been acutely realized by people in different sectors.

In order to come up with the future policies and the programs so that they always get together to develop the strategic forecast of what may or may not happen in the world 20 years hence. In order to come up with that forecast they have somewhere around 140 experts outside of the government getting together and forming several committees coming up with suggestions and their own estimate as to what might take place 20 years hence.

Now, this strategic plan is usually submitted to the Minister of International Trade and Industry to use such information in formulating the Ministry's policies on the programs. However, in the process of MITI coming up with long range plans in the strategic forecast they always look toward the private

sector input which includes not only businessmen but also academicians, labor unions and whatnot." (114)

Edward A. Feigenbaum. Dr. Feigenbaum, who has spent much time in Japan and coauthored a book on the Japanese Fifth Generation Computer Project, explained the Fifth Generation Computer Project and its potential impact on U.S. policy.

"The Fifth Generation Project is a remarkable and audacious ten year research and development effort aimed at developing computers and software that the Japanese will use and sell in the mid-1990s and beyond. Traditionally, computer "generations" have been marked by the hardware technology they employ: tubes, transistors, integrated circuits. The hallmark of the Fifth Generation, in the Japanese view, is the use to which the computers will be put. Fifth Generation computers will be engines for artificial intelligence, not merely for calculation or data processing. In artificial intelligence, the aim is to program computers to reason with knowledge. Thus the Fifth Generation reflects the Japanese view that in the 1990s we will be making the transition from machines that calculate to machines that reason; that this transition will be extremely important in human affairs and will open up a vast new market in information processing (the Japanese call it "the knowledge industry"). The Japanese view knowledge as the new wealth of nations, similar to the oil, natural resources, and agricultural products." (122)

"The Japanese Ministry of International Trade and Industry has set a goal for Japan to be number one in the world computer industry in the late 1990s and beyond. Since we dominate this market so completely today, a nontraditional strategy is called for. The MITI strategy has been to envision what the explosive markets for information processing in the future will be and to get there first, ahead of American firms that have not yet seen or appreciated these markets. No longer will they choose to imitate IBM. The Japanese choice is the area of artificial intelligence applications and associated computers." (123)

"To implement its strategy, MITI and the major companies of the computer industry of Japan have established a central national institute, the Institute for New Generation Computing Technology (ICOT), and parallel proprietary laboratories in each of the companies. Leadership for ICOT came from the MITI Electrotechnical Laboratory and from NTT (Japan Telephone and Telegraph Company). the participating companies are: Fujitsu, Hitachi, Nippon Electric Corporation, NTT, Matsushita, Mitsubishi, Oki, Sharp, and Toshiba. Each company contributed five young scientists (the "best and the brightest", according to ICOT's Director Fuchi)." (123)

"The work at ICOT is open and nonproprietary. There are many visits by Americans and Europeans, and open publication. There are no ICOT secrets. The Japanese call this "the pre-competitive phase". Technology transfer is done by people moving back and forth between ICOT and the proprietary labs. One of the company people goes back to his company's proprietary laboratory for one day every two weeks, to inform his lab of what has been transpiring at ICOT. At the end of the first three year phase, the company scientists and engineers at ICOT will return to their proprietary labs to provide the leadership for competitive proprietary developments, and a new group from the companies will be sent to ICOT for the next phase." (123)

"The Fifth Generation Project is guided by a daring plan that took three years to work out. The MITI commitment of funds is $450 million over the ten year period. The companies will match government spending after the first three years, bringing the total project budget for ten years to at least $855 million. American industry people have told me to expect the expenditure to be, by project's end, one billion dollars or more. In a break with the past, the funds will flow from MITI to the companies through ICOT (by contract) and not directly as subsidy. The intent is to allow ICOT to maintain a substantial level of control and direction of the national project." (123)

"Is there a threat? Yes. The country that leads the world's computer industry, and that pioneered the remarkable developments in artificial intelligence and brought these to the point of industrialization, cannot risk the loss of markets in the information processing industry envisioned by the Japanese long-range goal. As we lament the decline of our more traditional industries, the computing and information processing industry is emerging as the most important industry of the late twentieth century. Further, as the Japanese say in their plan, the computing industry is becoming the cutting edge of all other industrial activity. Computing is a tool not only of the knowledge worker but also of the modern industrial worker." (124)

Robert S. Cooper. Dr. Cooper commented on the advantages associated with research joint ventures, particularly with respect to computing technology.

"Several joint research ventures have been initiated in the U.S. in the last year or two. I believe these to be in the national interest as they have the desired effect of providing additional funding for research. By combining forces, companies can also spread the risks and costs of major new enterprises, such as the development of a Fifth Generation Computer, and combine key personnel who may have complementary talents. The result can be a major advance for the industry as a whole, with benefits in both the civilian and defense sectors." (130)

"Continued support for microelectronics and computer R&D is the only way we can assure our technology base rests on the latest and most powerful ideas in the scientific community." (130)

"The nation needs significantly more research in the computer and microelectronics areas. Activities such as the recently created joint research ventures appear to be viable mechanisms for further advancing the state of computer science and technology and we support them for that reason." (131)

Dr. Cooper described his views on the two key Japanese programs on Supercomputers and Fifth Generation Computers.

"...the former to develop extraordinarily powerful numerical processing machines and the latter to develop a new kind of super intelligent computer." (132)

"The Japanese Supercomputer program is exploring new electronics technology and computer architectures for producing very high speed "number cruncher" machines. These machines will do the arithmetic calculations needed for such applications as wind tunnel simulations, weather prediction, nuclear effects calculations, and general signal processing. These kinds of calculations are

characterized by three factors. First, many parts of the calculation are sufficiently independent that they can be performed in parallel -- at the same time -- in order to reduce the total time to completion. Hence, a multiprocessor architecture is the candidate of choice. Second, the fundamental calculations are numerical -- that is, arithmetic. Third, the computational requirements of each calculation are repetitive and predictable. Of course, each new wind tunnel calculation or weather prediction yields different results, but the amount and kind of calculation is essentially known in advance. Historically, a handful of U.S. companies have supplied the small market for machines of large processing power for these limited applications." (132)

"The Japanese Fifth Generation Computer initiative is developing both high speed microelectronics technology and computer architectures for efficiently performing very different kinds of calculations, namely those needed by intelligent computers for performing such tasks as inferencing, planning, reasoning, decision making, hypothesizing and learning. In performing these tasks, such computers have to access very large collections of underlying knowledge and may need sensory inputs similar to those found in humans, such as vision. Such Fifth Generation Computers bear little resemblance to "number crunchers". The fundamental kind of calculation that is performed by a super intelligent computer is symbolic or logical, not numerical. Thus, for example, it is important to be able to calculate the truth or falsehood of propositions, or make logical inferences and perform billions of such calculations at high speed. More significantly, such Fifth Generation Computers differ in that the calculations are neither repetitive nor predictable. A particular reasoning task might be modest or massive, depending on small details of the problem, and there is no way to know just what calculations will be required in advance. Thus, the architectures of Fifth Generation Computers place an extremely heavy demand on flexibility and responsiveness to widely varying requirements."

Dr. Cooper then indicated the source of many of the ideas being exploited in their computer projects.

"In pursuing both of these development programs, the Japanese are exploiting ideas in the areas of microelectronics, computer architecture, software, computer communication, and algorithms. Ironically, most of these ideas have been developed by U.S. researchers, primarily in universities, under DARPA support, during the last decade. The Japanese have shown outstanding talent in selecting the best technical ideas, including ones that have been essentially ignored by their competitors, and they have initiated a well organized and highly directed effort to transfer these research ideas into commercial products." (133)

Dr. Cooper described the new DARPA program on advanced computing.

"Turning now to the new DARPA program, in the FY 84 President's Budget we requested $50M to begin a new program called Strategic Computing and Survivability. This program will be aimed at developing a technology base for defense applications of super intelligent computers in the 1990s. The emphasis in the program is in the area of symbolic processing rather than "number crunchers". The effect will be to provide major new capabilities for future Defense requirements, and the commercial spin-offs will help the U.S. computer industry to meet, and in fact surpass, the Japanese activities addressed above." (134-135)

"I would like to draw the broad outlines of our approach. In our program we intend to address several critical technological areas, strengthen the ties between U.S. universities and U.S. computer companies and assist the university education process to increase the training of personnel in these critical areas. The technological areas we will address are microelectronics and VLSI (very large scale integrated) systems, computer architectures, generic software technologies, and initially we will focus attention on three specific military applications." (135)

"Underlying both "number crunchers" and super intelligent computers that do symbolic computations is the requirement for ultra-high speed electronic components that are compact, require little power, are highly reliable, and can survive levels of radiation in space and under battlefield conditions. To this end we are investigating VLSI circuits using GaAs; schemes for optoelectronic interconnections; and new ideas in packaging and VLSI architecture. Advances in these areas will be broadly applicable to new computers of many sorts, and can yield one or two orders of magnitude improvement in performance." (135)

Ed Zschau. Mr. Zschau, a Member of Congress from California, discussed industrial policy generally and provisions of bills proposed to provide antitrust relief for research joint ventures. Regarding industrial policy, Mr. Zschau said:

"The question is often asked, do we need in the United States an industrial policy and the answer is of course we do. We need to have a recognition that Government actions affect business and those actions might be disparate actions and confusing and causing contraditions. An industrial policy, to my way of thinking, is merely a rational and coordinated set of Government actions to affect business...

"There are those that assume that once we have agreed that we need an industrial policy or should have one that that means central planning -- some sort of Government planning agency that would pick the winners and pick the losers and allocate resources to the winners." (147)

My personal feeling is that such central planning, if we tried to implement it here in the United States, would be doomed to failure." (147)

"My feeling is that our industrial policy in the United States should be playing to our strengths in innovation, in developing new ideas and therefore our Government policy should target on the process of innovation. That is, we should be following Government actions that create an environment in which technological innovation can flourish..." (147)

"I believe that there are four prerequisites to the process of innovation that our governmental actions should focus on...

"No. 1, a commitment to basic research. We have to have the foundations for future products.

"No. 2, incentives for the risk takers, the entrepreneurs, the investors, the innovators, the companies to do R&D because you don't get innovation risk free. There is risk involved in the development of all new ideas.

"No. 3, we have to have an education system that provides enough trained technical people in order to develop those ideas. Currently in this country we are falling behind...

"No. 4, in order to have innovation you have to have ample opportunities, both domestic and foreign. That means a robust domestic economy and an aggressive international trade policy.

"If we have a process of targeting technological innovation, it will focus on research, incentives, adequately trained technical people and the development of ample economic opportunities." (148)

Regarding antitrust relief for research joint ventures, Mr. Zschau said:

"These projects, quite often, are too expensive and too risky for a single company to undertake. And the question is, What can we do in order to encourage that to remove some of the disincentives so that companies will take those risks?

"One of the concepts is to allow companies to form research joint ventures to pool their research results so they can both afford to make the commitments financially and afford the risk that is required.

"Unfortunately, even though the record for suits against such research joint venture is sparce, there is a concern that even if the Justice Department felt that such research joint ventures were not [anti]competitive, private suits might be lodged because of the incentive of treble damages." (148-149)

"There are two basic approaches... to reduce the risk of antitrust litigation in the case of bona fide R&D joint ventures.

"One is the approach recommended in House Resolution 1952 of which I am a cosponsor. That particular approach is that each R&D joint venture would have to file with the Justice Department and also meet certain criteria having to do with the market share of the companies that are involved in it, having to do with its openness to all participants on an equal basis and having to do with the licensing of the technology... if it meets these specific standards or qualifications, then it would be immune from antitrust litigation. (149)

"There is another approach to mitigating the risk of antitrust suits in the case of research and development joint ventures and that is to restrict the grounds for suit, to restrict the remedies for suit. (149)

"...I think that we need, in order to promote R&D joint ventures on a broad scale, more flexibility in the formation of those joint ventures than is allowed for in 1952. (150)

"My personal feeling is that if we eliminated R&D joint venture as a per se violation of antitrust law and we limited remedies injunctive relief only, that we would have a good balance ..." (150)

William F. Baxter. Mr. Baxter discussed his views on several of the existing legislative proposals providing antitrust relief for research joint ventures

and described the proposal of the Administration in this area.

"The bills that have been introduced thus far dealing with joint research and development (R&D) activity by U.S. firms appear to respond to concerns that United States firms are somehow at a disadvantage when competing against foreign firms in international markets. The bills also recognize, at least implicitly, that the growth and improvement of technology are necessary to foster a strong and productive economy. While the Department of Justice strongly concurs that the stimulation of technological advance is vital to our economic well-being, we believe the appraoches taken by those bills do not represent the most effective means of inducing innovation." (155)

"Certain of the bills currently pending before Congress would require the Attorney General to certify that applicant joint R&D ventures satisfy the criteria established under the bills. In its role as certifier, the Department would be required to oversee the structure and conduct of all joint R&D ventures, regardless of their anticompetitive potential. This would unnecessarily interfere with numerous innocuous joint ventures. Furthermore, it would entail the expenditure of substantial Departmental resources that could be better spent investigating and prosecuting anticompetitive behavior." (163)

"Next, certain of the pending bills would abandon the antitrust analysis that traditionally has been employed to determine whether a particular joint R&D venture is anticompetitive. However, it is extremely difficult, if not impossible, to imagine statutory criteria that would be as effective as traditional antitrust analysis in differentiating procompetitive from anticompetitive joint R&D ventures. The bills would replace that traditional standard with an immunity based on certain wooden and largely irrelevant criteria." (163-164)

"Of even greater concern to the Department of Justice are those criteria in the bills that would actually encourage anticompetitive joint ventures and destroy existing incentives to innovate. Certain of the bills seem to be premised in part on the notion that it is necessarily procompetitive and beneficial to give all United States firms open access to joint ventures and to obligate joint ventures to license their discoveries to non-member United States competitors after a limited period of time. To the contrary, open access and mandatory licensing will impair rather than promote competition. The larger the percentage of market competitors participating in a venture, the greater the venture's anticompetitive potential. It is only under very rare economic conditions that the exclusion of competitors from a joint venture and its fruits becomes a concern." (164-165)

"The mandatory licensing provisions contained in the bills, moreover, would diminish existing incentives for innovation. As I explained earlier, the system of exclusive rights under the intellectual property laws provides the means by which inventors and innovators can obtain a financial reward for their R&D efforts and thereby establish a strong incentive to invest in R&D. The provision for mandatory licensing in the bills would be a de facto repeal of the intellectual property laws and would in the long run reduce the flow of private resources into R&D." (165)

"Furthermore, when firms know that they will have access to their competitors' successful R&D efforts, their own incentive to invest in R&D may be reduced

significantly. They may choose instead to "free ride" on the efforts of other firms. While the ride would not be entirely "free" because of the required payment of a "reasonable" royalty, the competitors will be assured of access to the invention, and access is often critical." (165)

Ky P. Ewing, Jr. Mr. Ewing discussed studies undertaken earlier as to the relationship of antitrust laws and innovation.

"Beginning in about 1976, several studies were undertaken on American productivity issues, with the questions repeatedly being asked as to whether our antitrust laws impede innovation and whether joint research and development is legal." (179)

"As an outgrowth of those studies, and in response to a Presidential directive, the Antitrust Division published in 1980 its Antitrust Guide Concerning Research Joint Ventures. The Commerce Department and the Industrial Research Institute gave it widespread distribution among American businessmen. Its thesis is straightforward: If properly structured, most research joint ventures are compatible with our antitrust rules. And the Business Review procedures of the Justice Department and the Federal Trade Commission are available to assist business with prospective ventures, even though they are not binding on the government." (181)

He also addressed the question of why an antitrust problem is seen to exist for research joint ventures in view of the existence of the Business Review procedure.

"If a cooperative research and development venture, structured in accordance with the principles of the Antitrust Guide Concerning Research Joint Ventures is, on balance, pro-competitive, why should businessmen be deterred by antitrust fears? The answer lies in the risk of costly litigation. At present, in order to encourage private attorneys general to supplement Sherman Act enforcement by the government, we provide a treble-damage bounty. This stacking of the deck, as it were, in favor of litigation does not now distinguish between a suit against a covert horizontal price-fixing cartel and an open joint research-and-development effort that leaves marketing of the resulting innovative products up to the individual (and unilateral) efforts of each participant. Thus, the joint venture businessman today faces the risks of litigation, because of a bias toward it in the system. Also, that same businessman, if advised by sophisticated antitrust lawyers, must also appreciate that an astute plaintiff may well charge him with per se violations, in the hope of persuading a judge to use per se labels to condemn his venture, rather than engaging in a rule-of-reason analysis that would sort out the ultimate balance between some restraining effects and other pro-competitive effects." (183-184)

Mr. Ewing indicated that he believed certain changes were needed to respond to the problems mentioned above.

"In my judgment, Congressional action is needed -- not to make basic changes in the fundamental Sherman and Clayton Act prohibitions, and not to grant "exemptions" to targeted industries -- but to make five refinements in how the courts treat overt conduct that has the economic potential to be pro-competitive. These refinements are:

1) Statutorily require a rule-of-reason analysis (rather than permitting per se rules) on research and development joint ventures and on arrangements to create and transfer intellectual property.

2) De-treble rule-of-reason cases (i.e., permit single-damages only in such cases).

3) Statutorily require compensatory pre-judgment interest on the single-damages (thus making the injured defendant whole).

4) Amend the patent and copyright laws to eliminate outmoded "abuse" doctrines and to give protection to process patents.

5) Award attorneys' fees and court costs to defendants who are successful in defending against a plaintiff's per se antitrust claims, at least in cases involving research and development joint ventures and in cases involving arrangements to create and transfer intellectual property." (184-185)

Dr. Bruce Merrifield. Dr. Merrifield commented strongly in favor of legislation to encourage research joint ventures.

"I want to state right away we need to change our antitrust laws to encourage more joint research and development." (196)

"Joint research and development programs can be procompetitive. They reduce duplication, promote the efficient use of scarce technical personnel, and help to achieve desirable economies of scale. Small firms are able to collaborate in joint research and development projects, which because of prohibitive costs, they could not do by themselves. Large firms are jointly able to tackle today's large and complex technological problems, which are often beyond the ability of single firms. For all of these reasons, joint research efforts are key factors in the ability of countries to stay competitive in the international marketplace."

He pointed out that other countries are attempting to more efficiently utilize national resources by removing barriers to cooperative research and development.

"Of greater significance to us currently is that Japanese antitrust law did not prohibit firms from conducting collaborative research and development in MITI targeted areas such as computers, microelectronics, electronic instruments, lasers, optical communication, robots, and aerospace." (198)

"Similarly, French antitrust law did not deter French firms from conducting massive joint research and development projects in such areas as aerospace, telecommunications, microelectronics, energy, and conservation equipment. West German firms also have not been inhibited by antitrust restrictions in conducting joint research and development in computers, microelectronics, and electronic office equipment." (198)

"Further, the European Economic Community has exempted several collaborative joint research agreements of individual member countries from the antitrust

restrictions of Article 85 of its Treaty. For example, the European consortium Airbus Industrie led by France and West Germany has been able to conduct joint design, testing, and manufacturing, which assisted them in capturing roughly a quarter of the jet aircraft market in 1981." (198-199)

Dr. Merrifield indicated that the antitrust laws are impeding our ability to compete in international markets.

"In this regard, U.S. firms have consistently expressed the view that they are handicapped in competing in international markets because our antitrust laws inhibit joint research and development. U.S. firms say they are hesitant to invest heavily in joint research and development projects because of the high risk of treble damages and criminal sanctions under existing antitrust law." (202)

"The high risk perceived by U.S. companies in conducting joint research and development has persisted despite the Department of Justice "Antitrust Guide Concerning Research Joint Ventures," which attempts to clarify how the antitrust laws apply to a given set of facts. For one thing, guidelines by their nature have to be somewhat ambiguous to allow room for flexibility of enforcement policies which can vary from one Administration to the next." (203)

"The Business Review Procedure of the Department of Justice also has not dispelled industry's fear in this area. The Business Review regulations provide that upon a request setting forth proposed business conduct, the Department of Justice may issue a letter stating its present enforcement intention. It does not shield the venture from future DOJ challenge, and is not binding on the courts in private suits. Moreover, there is no assurance that the enforcement policy stated therein will not change from one Administration to the other." (203)

Jordan J. Baruch. Dr. Baruch summarized his views on reasons why our policy concerning industry, government and academia cooperation may be less successful than policies of others.

"We are faced with the kind of challenge that may finally break the paralysis that has gripped this country for many years. While the leaders in Japan have rallied industry, government and academe behind a national purpose aimed at making their country an economic leader in the western world, we have clung to the simplistic notion that if government, academe and industry all pull in the directions dictated by their own self-interest everything will come out alright. Other nations invest huge sums to advance their industrial technology, to increase the quality and quantity of the engineers they produce and to insure their industries the capital credit necessary for modernization. We on the other hand, simultaneously bemoan the shortage of innovation and of skilled technologists and cut our educational budgets, squander our nation's credit and spend less on national technological endeavors than we do on arcade games. Even today when other countries have made clear that they view the nation as the fundamental unit of business when dealing with the outside world, we apply the same strictures to our industry in trade that we do in their dealings with our domestic population." (213)

With respect to research joint ventures, Dr. Baruch indicated certain criteria that he believed should be included.

"While there exists proposed legislation, I would like to describe some criteria that I see for antitrust legislation to stimulate industrial innovation in this country in general. First, as in the case of the present legislation, it must protect joint research and development activities and yet must make sure that it is not protecting joint activities in production, marketing or price fixing that reduce domestic competition and inhibit the entry of new companies in a competitive posture. Indeed, I would like to see the legislation not merely protect joint research and development but actually encourage it. While it encourages joint research and development, however, it must make sure that it is still economically possible for members of an industry to pursue research directions not covered by that joint activity. Lastly, on my list of criteria, I'd like to see the legislation encourage joint research and development among United States companies while excluding foreign firms, foreign-owned subsidiaries or other U.S. divisions or entities that would merely serve as a conduit to foreign companies for the results of that joint research and development." (215)

Dr. Baruch spoke in favor of a stronger national commitment to technological and industrial leadership.

"In 1980, the Congress passed and the President signed into law the Stevenson-Wydler Technology Innovation Act of 1980. In this session of the Congress, Mr. Brown of California introduced H.R. 481, a bill to establish a National Technology Foundation. Both the act and the bill represent reasonable blue prints for what culd become a national commitment to technological and industrial leadership." (217)

"At President Carter's direction, an Advisory Committee on Industrial Innovation was formed, with representatives from industry, academe and government to examine what the Federal Government could do to encourage industrial innovation. Their final report is available from the Superintendent of Documents as stock #003-000-00553-4 or from the National Technical Information Service as Item No. PB80-13175-8. Many of the recommendations that were culled from that final report have already been implemented and others are present in Stevenson-Wydler and H.R. 481." (218)

Dr. Baruch directed specific attention to the following three recommendation areas from the above report: (1) Industrial Technology Development Centers, (2) Foreign Technical Information, and (3) Labor Technology Forecasting.

J. F. Mathis. Dr. Mathis described the organization and operation of the Chemical Industry Institute of Toxicology (CIIT).

"CIIT is a scientific research membership corporation located in Research Triangle Park, North Carolina. It is supported by thirty-three companies which make or use chemicals. Its present members collectively produce about three-fourths of the sales volume of the U.S. chemical industry." (246)

"CIIT has a full-time staff of 106 research scientists and support personnel. Its scientific work is divided into Departments of General and Biochemical Toxicology, Genetic Toxicology, Pathology, Cell Biology and Epidemiology. The staff is as separate from the CIIT membership as it would be in a hospital, a university, or a religious institution." (246)

"CIIT's research facilities were completed in 1980. Its toxicological testing facilities and instrumentation are "state of the art", and among the finest in the world today. It can handle large animal as well as rodent testing, has analytical capabilities below the parts per trillion level, and control mechanisms which insure the highest quality output at minimum risk to personnel." (247)

"CIIT's research facilities cost $15 million. Its operating budget is approximately $10 million annually. It is funded by its membership, with annual dues (based on sales volume) ranging from $33,000 to about $800,000. Each member also commits to a rolling three-year forward dues schedule to provide an element of financial continuity to support of the research program." (247)

Dr. Mathis described some of the achievements of CIIT.

"Progress in toxicology research takes a very long time. Even relatively routine rodent testing can take years to complete; efforts to discover the causes of cancer have already taken generations. CIIT was only first proposed in 1974. Before the critical long-term research and testing could begin, it took much time to structure CIIT's program, to obtain the support and membership of aggressive and sometimes suspicious competitors not accustomed to joint efforts of this kind, to raise the substantial funds needed during periods of serious inflation and then recession, to seek out and employ first-quality scientists in disciplines where shortages have been endemic, and to design and build unique research facility." (248)

Dr. Mathis explained the policy of CIIT established to avoid potential anti-trust concerns.

"CIIT's success surely works to the advantage of its membership in the sense that those who support a hospital or university benefit from its success. But CIIT has no short-term competitive objective as such. Its program was developed from the outset with a deliberate view to avoiding any competitive advantage which might result from membership. It was described in CIIT's application for a Business Review Letter from the Justice Department. Exhibits "C" and "D" are the application and Justice Letter." (250)

"Perhaps most significant in this connection is CIIT's policy that scientific research of potential competitive significance must be held either completely confidential, and disclosed only internally within CIIT, or made uniformly public to all. CIIT's President, who is an eminent toxicologist and an employee of the Institute, decides with advice from his scientific staff at what point significant findings have been made. At that point he has been instructed by Board Policy to release the information publicly as soon as possible. Thus CIIT members are not furnished advance notice of information which might be commercially useful. In implementation of this policy, CIIT publishes it research plans, progress and findings widely to government, industry, academe, and the media. All this is furnished even to those who do not support CIIT, an irritant on occasion, but again no different than the service a hospital or university provides even to those who will not support it." (250-251)

Steven J. Olson. Mr. Olson described in detail his views on why he believes

clarification of our antitrust laws are needed to foster research joint ventures.

"The confusion under current law is compounded by the fact that, even if the Justice Department or FTC should agree that an R&D venture passes muster, there are a lot of private lawyers ready and willing to disagree. For example, as I'm sure many of you are aware, a San Francisco antitrust lawyer who generally represents treble-damage plaintiffs -- Joseph Alioto -- has written each MCC shareholder stating flat-out that he thinks MCC is illegal. Is it any wonder that business persons are deterred from joint research activities?" (264-265)

"Instead, we should be looking for ways to achieve the integrated, high volume operations we need without sacrificing the diversity we value. Yet, the antitrust laws and those who enforce them seem to remain firm in their bias against collaboration among competitors. The Assistant Attorney General rails against executives even comparing golf scores, and the Supreme Court, in Texas Industries, reaffirms the rule that antitrust defendants are not entitled to contribution from their co-conspirators. Because the rule, by definition, applies almost entirely to multi-party cases, and because the result is to hold the spector of enormous damages over the head of small or minor participants, the effect is to deter very strongly any collaboration among competitors, particularly the small and financially weak." (269)

Mr. Olson spoke in favor of one of the legislative proposals. "H.R. 1952, introduced by Rep. Synar, Gephardt, Wyden and Zschau, and cosponsored by Congressman Walgren and several other members of this Committee, embodies a more comprehensive and effective approach. Under its provisions, Congress would prescribe statutory criteria for lawfully organizing and conducting joint R&D ventures which, if met would shield a venture from antitrust attack. A set of objective standards or rules would be enacted, and those companies desiring to cooperate in R&D could then plan and implement their activities accordingly. This would remove existing uncertainty because companies would know in advance how to organize and conduct their R&D joint ventures." (270-271)

"If a venture complies with these standards, its activities would not be subject to either criminal or treble-damage liability. Congress will have declared such compliance to be presumptively lawful. Of course, activities falling outside of the standards would remain fully subject to the dual deterrents of governmental and private actions." (271)

"This approach is preferable over that contained in those bills which would require any venture to be "certified" by the Justice Department. We do not think it either necessary or desirable that another bureaucracy be created to solve this problem. We would prefer a law that the private sector could itself understand and apply. Further, to be successful, such ventures must remain fluid, with strategic decisions constantly reviewed and redirected in light of experience provided by the process. A rigid certificate authorizing certain described venture activities is wholly inappropriate to this environment." (272)

"Before closing, I would like to emphasize that we are not talking about a massive restructuring of the antitrust laws, but rather a relatively simple clarification which would encourage sharply limited, pro-competitive cooperation at the pre-product, pre-manufacturing and pre-marketing level. Other

countries have opted for government sanctioned and directed cartels. This legislation stops far short of that, but gives U.S. companies -- and not just huge, dominant enterprises -- the legal environment they need to respond." (272)

Joseph F. Brodley. Mr. Brodley discussed the general issue of the effect of antitrust law on joint research ventures.

"To the student of antitrust law assertions that antitrust enforcement has stymied research joint ventures have a peculiar ring since enforcement has been exceedingly modest. A pure research joint venture without ancillary restraints has never been challenged by the Antitrust Division. Even as a matter of theory, the Division would raise no objection to a joint venture involving basic research unless it included the entire industry. Even when a joint venture involves applied research, the government would object only if the joint venture included a group of firms having high market share." (281)

He indicated that any "chilling effect" was much stronger with respect to private action.

"The argument that the antitrust laws inhibit research joint ventures rests much less on the risks of government enforcement than on the hazards of private enforcement. The ease with which an antitrust cause of action can be stated, the heavy expense of antitrust litigation and the risk, even if small, of heavy triple damages or crippling injunctions arguably has a chilling effect on the formation of research joint ventures. The force of the argument is limited, however. First it is based on assertions, rather than empirically validated propositions. Second, even if adverse effects occurred in the past, antitrust law is becoming substantially more permissive, and this is particularly true in the field of joint ventures." (282)

Mr. Brodley expressed concern about some of the provisions contained in legislative proposals.

"Several bills contain provisions that would reduce antitrust damages, or otherwise restrict the advantages accorded plaintiffs in antitrust litigation. These include provisions which would be applicable to research joint ventures: the limitation of antitrust damages to single damages (in the Edwards and Administration proposals); the preclusion of the per se rule (in the Administration proposal); and the several proposals to make attorney's fees payable by the plaintiff under certain circumstances. All of these proposals are undesirable because they undertake basic change in the remedial structure of the antitrust laws without assurance that such change will solve the specific problem to which the bills are addressed. Yet such change could have serious implications for the development of antitrust law generally." (285-286)

Mr. Brodley suggested that deferral of legislative action would be a viable alternative. "A viable alternative would be to desist from making changes at this time, and instead to undertake a comprehensive study, perhaps conducted by a bipartisan commission. One indication that this could be fruitful is the wide divergence between the various legislative proposals, a condition that suggests that the problem is not yet well defined." (289)

Gerald Sobel. Mr. Sobel stated that antitrust concern tends to discourage

research joint ventures.

"In this country the uncertainty of exposure to antitrust liability for joint research activities tends to discourage such ventures. New legislation which would provide for a binding advance determination of a joint research venture's legality under the antitrust laws and exclusive rights to the technological results of an approved venture would mitigate this problem." (297)

"Since the enactment of the Sherman Act in 1890 the United States has developed a strong antitrust policy. As part of this policy, the Sherman Act, in an effort to foster competition, forbids combinations among companies which unreasonably restrain trade and monopolies which are unlawfully acquired or maintained." (298)

Mr. Sobel gave an example of how antitrust cases can be long-delayed in addition to being simply long.

"SCM's major antitrust case against Xerox, in which I was one of Xerox' defense counsel, is a good illustration of long-delayed antitrust exposure. It presented a classic case of a successful innovation, and joint research was a part of the development process. Xerox started its research and development work on xerography in 1947 pursuant to a license from Battelle, a research institution, that had obtained patent rights from the inventor of the xerographic process, Carlson. Xerox worked continuously thereafter to develop the process and copying machines using the process. In addition to its own research and development work, Xerox sponsored research at Battelle and, for a time, Battelle underwrote some of its own xerographic research. Many patents were obtained on the results of the research. Purusant to licenses to Xerox, Carlson and Battelle had a royalty interest in the process. Then, in 1956, in return for transferring title to certain patents to Xerox, they obtained stock in Xerox. (301)

In 1960, Xerox introduced the first plain paper copier, which was protected by patents owned by Xerox. The copier was a commercial success. Improved machines followed.

In 1973, twenty-six years after Xerox launched its xerographic research and development effort, thirteen years after Xerox brought out its first xerographic plain paper copier, and well after Xerox had made a success of that product and more advanced ones, SCM started its antitrust suit.

"The parties conducted discovery and prepared for trial for four years, and then the case was tried for over a year. Xerox won the case after trial and prevailed on SCM's appeal. Certiorari was denied by the Supreme Court, ending the case in 1982, nine years after it was started -- thirty-five years after Xerox began its xerographic work." (302)

Mr. Sobel commented on the weakness of the Business Review procedure as a means to eliminate antitrust concern.

"A business review program now in place at the Department of Justice offers review of proposed activity but, at best, merely culminates in a statement by the Department of Justice of its then present enforcement intentions. While clearance under this procedure suggests that the chances of a subsequent

government suit are slight, it does not preclude such action. The FTC has similar procedures. Neither clearance, moreover, is a defense in private suits." (305)

Mr. Sobel indicated that legislation was needed in this area.

"Legislation should be enacted to create a vehicle for advance binding legal clearance and also to clarify the right to exclusivity." (306)

"A precedent for the grant of exemptions from the antitrust laws by the Attorney General of joint arrangements which serve an important public policy goals is found in the Newspaper Preservation Act. It exempts certain joint newpaper operating arrangements which serve to save struggling newspapers from financial failure.

"The legislation described above would reduce the antitrust deterrent to joint research and, in the process, stimulate invaluable innovative activity." (307)

Alvin M. Stein. Mr. Stein commented that in his opinion changes to the antitrust laws to promote research joint ventures are not needed and may, in fact, result in anticompetitive situations.

"The major stated purpose of the proposed legislation is the perceived concern of United States companies that their participation in research joint ventures may expose them to attack under the antitrust laws. I submit that such fears are misplaced and have not been engendered by any actual developments in more than seventy-five years of antitrust history." (315)

"As recently noted in the Justice Department's Antitrust Guide Concerning Research Joint Ventures (1980) (hereinafter referred to as the "Guide"): "A pure research joint venture without ancillary restraints has never been challenged by the Antitrust Division." (315-316)

"The Guide itself was drafted to respond to apprehensions concerning application of the law to research joint ventures, and certainly this document has gone far to clarify that joint research may be engaged in without violating the antitrust laws." (316)

"The Guide also discusses those agreements or restraints commonly found ancillary to joint research venture agreements which have historically been found unlawful and which may accordingly be likely to subject businesses to antitrust scrutiny. Examples of such agreements contained in the Guide include pooling of confidential information, such as product introduction dates, and restrictions on independent development, production and marketing of the inventions resulting from the research." (316)

"It has frequently been noted that research joint ventures may lead to anticompetitive risks similar to those found in any joint venture arrangement." (316)

"Thus, any joint venture may facilitate exchanges of price information, horizontal territorial allocations, agreements not to engage in independent research, agreements not to deal with competitors of one joint venturer, or agreements to withhold the products of research from the market." (316-317)

Mr. Stein observed that the elimination of treble damage awards may eliminate private action as a means of antitrust law enforcement.

"Without the potential for treble damage recoveries, private enforcement of antitrust law will not simply be discouraged, but may well become extinct. In fact, even under current laws, the number of private parties willing to undertake this burden has decreased as the result of the overwhelming cost and duration of most antitrust litigation." (322)

Douglas H. Ginsburg. Mr. Ginsburg commented that it may in general be very difficult to distinguish between a procompetitive and an anticompetitive venture, but that many factors were involved that needed to be evaluated.

"The complex interplay of these factors requires that the Attorney General be given substantial discretion to evaluate proposed research joint ventures on a case-by-case basis. The Attorney General proceeds in this manner at present, under the Antitrust Division's business review procedure. That procedure is informed to some extent by the Antitrust Guide Concerning Research Joint Ventures, released by the Antitrust Division of the Department of Justice, in November 1980." (328)

Mr. Ginsburg stated that in his opinion the evaluation of research joint ventures should not be subject to judicial review. The availability of such a review, although seemingly fair, would undermine the very objective of providing favorable review of the venture's activities.

He also spoke favorably for legislation that would provide immunity for research joint ventures.

"Legislation that enabled the Attorney General to grant an effective immunity to the participants in a joint research venture would make good sense. While firms proposing a joint research venture must derive substantial comfort from knowing that the Antitrust Division does not view their collaboration as unlawful, they cannot be unmindful either of the possibility that their efforts will be met with private litigation, with its attendant risks and inevitable costs. These risks and costs may be a substantial deterrent to would-be joint venturers, notwithstanding the Department of Justice's non-enforcement position." (328-329)

"...private antitrust actions are authorized, as the Supreme Court has often said, to enlist the efforts of "private Attorneys General" in support of the public policy favoring competition, which is expressed in the antitrust laws. If a proposed research joint venture would be pro-competitive rather than anti-competitive, and if subjecting the collaborators to the risks and costs of private litigation would prevent them from going forward, then private rights of action would frustrate the public interest in competition. The risks, costs, and delay inherent in judicial review proceedings could have almost the same effect -- chilling the parties' interest in collaborative research -- as would a de novo antitrust suit. Firms would surely be reluctant to begin their collaboration knowing that a year or two could lapse before a reviewing court might determine the legal status of their efforts." (330)

Mr. Ginsburg stated that some of the requirements contained in pending legislation could, in fact, be anticompetitive. He spoke in favor of the parties to

a research joint venture having the maximum possible degree of freedom to structure their undertaking as they see fit.

"The bills pending in the current Congress would impose a variety of constraints on the parties to a research joint venture. Some would require that any firm have a mandatory right of access to participate in other firms' research joint ventures, or to obtain a compulsory license to its technology. Some of the bills would require that a "management board" be established, analogous to a corporate board of directors. The management board would have specific legal responsibilities and even a requirement that there be some members unaffiliated with the collaborating firms, in the nature of independent directors in the corporate setting." (330-331)

"These structural requirements would presumably be inapplicable to research joint ventures that did not seek immunity from private antitrust actions. At the same time, these requirements would not advance, but would frustrate the purposes of the antitrust laws. The mandatory right of access and compulsory license are probably anti-competitive. The management board requirements are costly and unnecessary, at least if approved research joint ventures are limited to those which are pro-competitive in the first place." (331)

"In addition, mandatory sharing rights will diminish the probability that competing centers of joint research activity will be established in a particular industry." (332)

APPENDIX 1

Staff Analysis: The Role of Governmental and Non-governmental Factors in Promoting Research and Development in Japan

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I. PROMOTION OF JOINT RESEARCH AND DEVELOPMENT

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III. NON-GOVERNMENTAL FACTORS CONTRIBUTING TO JAPAN'S TECHNOLOGICAL SUCCESS

1) Economist article re: Japan
2) U.S.-Japan HiTech Work Group recommendations

Through the use of research joint ventures and other governmental policy instruments, the government of Japan has promoted research and development. Additionally, non-governmental or societal factors, such as the large percentage of technically trained people in Japan's work force, have contributed to Japan's technological success.

This analysis, based on the Subcommittee's hearings, is intended to present a more comprehensive picture of the development of research and technology in Japan, than that presented in the main body of the report.

I. PROMOTION OF JOINT RESEARCH AND DEVELOPMENT

Through a combination of policy instruments, including the authority to exempt certain industries from the nation's antitrust laws, Japan's MITI has played an influential role in promoting joint research and development.

Since 1964, when Japan began to broaden its trade policies, MITI's power has changed. With trade expansion, MITI was forced to relinquish foreign currency allocation as a major policy instrument.[1] Its authority has since taken the form of "administrative guidance," i.e., the authority to listen, coordinate and persuade, but not to control.[2]

Aided by an Industrial Structure Council made up of academia, industry, consumer groups and labor unions, MITI's decade-long "visions" have set the tone for industrial planning in Japan since the mid-1960s.[3] Its vision of the 1970s galvanized the nation toward knowledge-based industries. During the 1970s, two laws designed to promote the electronic and machinery industries -- referred to as the Kidenho[4] and Kijoho,[5] gave MITI responsibility for guiding industry in collaborative efforts such as the formation of joint ventures, while the Japanese Development Bank (JDB) was authorized to make low interest loans to favored industries.[6] The two laws also provided MITI with authority to approve research joint ventures and exempt the participants from U.S.-type antitrust laws when perceived to be in the public interest.[7]

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[1]GAO Report: Industrial Policy: Japan's Flexible Approach (GAO/ID-82-32) at 46. The GAO report was one of two reports summarized by witness Alan Mendelowitz in his testimony, and is annexed to the record of the hearing as Appendix 1. The second GAO report is entitled, "Industrial Policy: Case Studies in the Japanese Experience" (GAO/ID-83-11), and is annexed to the record as Appendix 2.

[2]Appendix 1 to the record at 47.

[3]Id. at 28.

[4]Appendix 2 to the record at 6. Translated, Kidenho means "The Law on Extraordinray Measures for the Promotion of Specific Electronic and Machinery Industries." The Kidenho expired in 1978. Id.

[5]Id. at 8. Translated, Kijoho means "The Law on Extraordinary Measures for the Promotion of Specific Machinery and Information Industries." The Kijoho went into effect in 1978 and expires in 1985. Id.

[6]Id. at 6.

Armed with such laws, MITI has been successful in organizing some of Japan's major corporations into large-scale R&D efforts. During the 1970s, the most successful of these was MITI's VLSI (very large-scale integrated circuit) program -- a program, in part, intended to provide Nippon Telephone and Telegraph Corporation (NTT), the public communications monopoly, with integrated circuits possessing large-scale memory capability.[8]

With money provided in the form of success-conditional ("Hojokin") loans,[9] MITI funding for the research effort amounted to 30 billion yen, or better than 41% of the total 72 billion yen cost of the venture.[10] The success of the effort is evidenced by the more than 1,000 patents that were developed during the five year life of the project.[11] More significantly, by the end of 1982, Japanese firms held 66%[12] of the world market for the then state-of-the-art 64K RAM microchip. This percentage is to be compared with 1978 when Japan enjoyed only 38% of worldwide sales[13] in microchips and U.S. companies could claim the rest.

Though the success of the VLSI project is unquestioned, certain cautions involving MITI's role are appropriate. First, as set forth below, it has been claimed that Japan's VLSI breakthroughs are attributable more to NTT's in-house research efforts than to the joint research project organized by MITI:

> "Foreign competitors exaggerate the importance of MITI in shaping Japan's industrial future. But they underestimate the role played by public monopolies like NTT, the telephone corporation, in nurturing domestic suppliers with preferential contracts and technical help. With the biggest -- and certainly the best -- research laboratories in Japan, NTT develops most of the really advanced microcircuits it needs for its telephone exchanges. The country's half dozen major semiconductor makers are reckoned to have received more knowledge for producing big microchips informally from NTT than they did under MITI's famous $130m VLSI (very large scale integration) support programme."[14]

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[7] Appendix 1 to the record at 50.
[8] Appendix 2 to the record at 7.
[9] Id.
[10] Id.
[11] Id. at 8.
[12] Data supplied by Congressional Research Service (CRS). See Appendix 5 to the record. The CRS figures project a decrease in the Japanese share of the 64K RAM market to 60% by the end of 1983.
[13] Id.
[14] July 19, 1983 Economist at 18. The Economist article was incorporated by reference in a statement for the record (see appendix 4 to the record) provided by Mr. Justin L. Bloom, former Counselor for Scientific and Technological Affairs to the U. S. Embassy in Tokyo, at

(Footnote continued)

In addition, Professor William Ouchi of the University of California, Los Angeles, makes the case that the VLSI project was not really orchestrated by MITI.[15] Rather, states Ouchi, the VLSI project was the product of national consensus-taking, and that, before MITI ever decided to fund the project, there were numerous dialogues both within the semiconductor industry and outside of it.[16] Out of these dialogues came the consensus that government time and money on behalf of the semiconductor industry would benefit the nation as a whole.[17] Accordingly, other industries that also may have wished comparable funding stepped back, knowing that, when the time was ripe for them, a similar national consensus would support their position.[18]

The result of the above, asserts Ouchi, is that by the time MITI undertook the project, it was a coordinator of an established national referendum rather than the dictator of a new direction.[19]

The above notwithstanding, as Japan begins to carry out MITI's "vision for the 1980s" -- a move toward leadership in new technologies -- MITI's role as stimulator of the nation's research policy seems secure. In addition to the first phase of the VLSI project discussed above, MITI is financing 45 percent of the Electronic Computer Basic Technology Research Association (ECBTRA), the organizational entity for the second phase of the VLSI project.[20] Seven of Japan's largest companies are part of the ECBTRA effort. Also, the Japanese Government, through MITI, is covering fully all of the projected $100 million, 10 year costs of a project to develop a high speed computer.[21] The project, known as the "Association for the Development of High Speed Scientific Computers (ADHSSC)" was formed in December 1981 by six companies and has since been commissioned by MITI to do R&D under contract.[22] Finally, in the area of computers and software, the government, under MITI sponsorship, has initiated a 10-year, $450 million government-industry R&D effort to develop a "Fifth Generation" artificial intelligence computer.[23]

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[14](continued)
the request of Subcommittee staff. The Economist article is appended to this staff analysis as Appendix 1.

[15]See Appendix 3 to the hearing record.

[16]Id.

[17]Id.

[18]Id.

[19]Telephone interview between Subcommittee staff and Dr. Ouchi.

[20]Appendix 2 to the record at 11.

[21]Id. at 11-12.

[22]Id.

[23]Feigenbaum at 113. Unless prefaced by the word "statement," page numbers following a witness' name refer to transcript pages. Unless otherwise indicated, all transcript references pertain to the Subcommittees' June 29 hearing. Thereafter, all references will be to the Subcommittees' June 30 hearing.

In other fields, GAO reports projected government expenditures of over $400 million to develop basic technologies for the "next generation" of high technology industries.[24] "The projects will last from 8 to 10 years with a total of 48 private companies and 10 national R&D laboratories participating."[25]

The Japanese Government has also planned for development of an "intelligent robot" through collective research. GAO estimates that the amount budgeted for the project is about $70 million. As Alan Mendelowitz, GAO witness at the hearing, stated:

> "Research and development in the robotics industry is conducted by (1) universities, (2) public research institutions, and (3) private companies. Public research has concentrated on basic research and theoretical problems such as vision and sensory perceptions. The government's attempt to set up a national, long-term research effort was postponed repeatedly because of budgetary constraints. It now appears that it will be funded at about $70 million with the goal of developing an intelligent robot by 1990."[26]

Of the various MITI-sponsored joint research projects, the planned Fifth Generation computer project to develop artificial intelligence computing has provoked the greatest amount of attention in this country, in part because of its ambitious goals and in part because of the technological and security implications of a non-U.S. entity becoming the first to possess an artificial intelligence capability.[27]

The potential uses of a computer with an artificial intelligence capability, are legion. For example, in the medical realm, once provided with symptoms, an artificial intelligence computer could not only diagnose -- a capability now possessed by some expert computer systems -- but could also prescribe a program of medication. As Edward Feigenbaum stated:

> "The hallmark of the 5th Generation, the slogan coined by the Japanese, is the use to which the computer will be put. The 5th Generation computers will be engines for artificial intelligence not merely for traditional calculation or data processing. In artificial intelligence, the aim is to program computers to reason using knowledge. Thus, the 5th Generation reflects the Japanese view that in the 1990s we will all be making the transition from machines that calculate to machines that reason, and that this transition will be extremely important in human affairs and will open up a vast new market in

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[24]Appendix 2 to the record at p. 12.
[25]Id.
[26]Mendelowitz statement at 15.
[27]Feigenbaum at 114.

> Information processing. The Japanese have a slogan for that too. They call it the knowledge industry. The Japanese view knowledge as the new wealth of nations, similar to oil, natural resources and agriculture."[28]

In the military arena, the applications of an artificial intelligence computer are equally extensive, a factor which has prompted the U. S. Department of Defense to plan for a Fifth Generation computer capability.[29]

Unlike many past Japanese Government-funded programs where only a small percentage of the R&D funding was provided by the government, the Fifth Generation project is one where better than 50%, or $450 of the planned $850 million price tag, will be absorbed by MITI.[30] Indeed, the current plan is for MITI to pay for all costs during the first three years with industry absorbing half of the cost in the succeeding seven years of the project.[31]

To implement the program, MITI has established an Institute for New Generation Computer Technology (ICOT) and has designated Kazuhiro Fuchi, formerly head of the information science department of the Japanese Electrotechnical Laboratory, as ICOT's director.[32] Fuchi, in turn, has recruited five of the brightest young scientists from each of the eight Japanese corporations that comprise the ICOT consortium.[33] These scientists will serve for a period of three years before being rotated back to their home companies and replaced by fresh talent.[34]

In sum, since 1980 when MITI issued its vision for the 1980's exhorting Japanese industry to build a technology-based industry within 10 years, Japanese research has focused on new technologies, such as high speed computing, robotics, artificial intelligence computers and biotechnology. Many of these new technologies will benefit from government funding, particularly funding designed to promote joint research and development.

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[28] Feigenbaum at 110.
[29] Cooper at 129.
[30] Feigenbaum at 113.
[31] Id.
[32] Feigenbaum at 122.
[33] Id.
[34] Id.

II. OTHER JAPANESE GOVERNMENT POLICIES INFLUENCING TECHNOLOGICAL DEVELOPMENT

Overview

The policy instruments used by the Japanese Government to promote technology are varied and are often tailored to meet the needs of specific industries. As the nation has progressed from its post-war recovery period, when the government's principle function was to nurture and protect young industry, to the present, its national requirements have changed and so have its policy instruments. Today, much of Japanese Government policy is in the form of incentives designed to accomplish specific technological goals. Many of these represent the leading edge of technology.

In 1952, Japan regained its independence and, with it, the ability to rebuild its war-ravaged economy. Using foreign exchange earned from sales to the U. S. military during the Korean War,[35] Japan started its economic climb by emphasizing critical industries. At first, these industries included such mainstays as iron and steel, electric power, coal mining and shipping.[36] Gradually, following the directives of its Occupation-era Economic Planning Agency, Japan moved into other heavy industries such as petrochemicals, automobiles and nuclear power.[37] These industries were stimulated by tax incentives, and protected by regulation of foreign investment and by the imposition of import restraints.[38]

By 1965, Japan had achieved most of its postwar redevelopment goals, and was showing a positive position in its balance of payments account.[39] At that time, MITI began to formulate its "visions", or, industrial directions, for the nation. Among other things, the agency promoted social development such as pollution control, social welfare such as housing and knowledge-intensive enterprise such as electronics and computers.[40]

As with the earlier generation industries, the newer technologies were benefitted by a number of promotional measures: tax incentives were designed to promote investment and export,[41] high debt leveraging was made possible by commercial loans which were available at artificially low interest rates;[42] trade barriers, in particular, non-tariff trade barriers, made it difficult for foreign producers to compete with emergent Japanese industries;[43] and loans from the Japanese Development Bank (JDB) were used to promote various industries, especially utilities and shipping (and, later on, electronics).[44]

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[35] Appendix I to the record at 1.
[36] Id. at 27.
[37] Id.
[38] Id. at 33-35 (import restraints); 37 (foreign investment); 39-41 (tax measures).
[39] Id. at 7, and 26.
[40] Id. at 27.
[41] Id. at 41.
[42] Id. at 9.
[43] Id. at 43.

During the period of the early 1960s, MITI's power was at its greatest.[45] Armed with authority to approve foreign technology contracts and, with such approval, access to strictly controlled foreign currency, the agency held considerable power over those companies who were dependent on imported technology.[46] This authority was relinquished in 1964 when Japan became a signatory to the International Monetary Fund, and, pursuant to Article VIII of the IMF Articles, committed to relinquish dual exchange rates as a means of controlling foreign exchange.[47]

Views of MITI's importance to the Japanese technological effort vary considerably. As noted earlier, scholars such as William Ouchi[48] make the case that much of Japan's industrial success is attributable to consensus-taking among Japan's major industries coupled with a legal system that supports such interaction[49] and a willingness on the part of government, labor, and industry to work toward common goals. Others take the view that Japan's success is attributable to massive intervention by Japan's government agencies, especially MITI, into the affairs of favored industries.

While the Japanese Government's role, and presumably the role of MITI, has been described as that of a "domestic promoter,"[50] i.e., it "provid[ed] funds to encourage R&D, financial expansion, promoting the development of markets, and where necessary actually structuring the terms of competition",[51] MITI and the government's role in promoting technology has also been assessed in terms of the difficulties inherent in promoting technology. Thus, as Justin Bloom states:

> "There is no question but that government/industry/labor cooperation is much stronger in Japan than it is here, but it is going too far to think either that this collaboration is uniformly successful or that Japanese industry accepts MITI's guidance without question. We all know the success stories, and logically so. What is not discussed so much are the failures and the problems. I cannot give a catalog of these here, but a few cogent examples may suffice. In the 1960s MITI organized and sponsored the development of a commercial passenger aircraft. The Japanese domestic airlines purchased the plane and a few were sold abroad, but the project failed with the introduction of the smaller class of jet air-

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[44] Id. at 34.
[45] Id. at 26, 35, 37.
[46] Id. at 38.
[47] Id. at 42.
[48] See discussion notes 15 - 19.
[49] Though the application of U.S. antitrust laws to research joint ventures is discussed in the main body of the report, neither the hearing nor the report addresses the broader question whether Japanese-style consensus-taking would be permissible under U.S. antitrust laws.
[50] Zysman statement at 2.
[51] Id.

> craft built in the United States. As a consequence of the development of assembly line techniques for the manufacture of merchant ships, Japan almost captured the world market, only too find that too large a capacity had been installed. The ensuing readjustment that was required was expensive and set back the normal pace of Japan's industrial growth. After the oil shock of 1973, MITI tried to take on the responsibility for all R&D in the energy field other than nuclear energy through its 'Project Sunshine'. Notwithstanding its preparation of elaborate plans and glossy brochures, MITI could never obtain sufficient funding from the national government to make any significant progress."[52]

However one views MITI's role, it seems clear that MITI's involvement is extremely useful to a project. MITI involvement sends a strong signal of governmental approval. It tells the public and the banking community that the government thinks a certain project is a good idea and is proceeding in the right direction.[53] Additionally, policies developed by the Ministry of Finance and the Bank of Japan, in lending money to the nation's major commercial banks, frequently have been supportive of MITI's goals, though, on occasion, the two banking institutions have disagreed with MITI on major policies.[54]

Where MITI has lacked legislated policy instruments, it has used persuasion through administrative guidance.[55] Its efforts, backed by incentive funding, have helped to spearhead the projects discussed in the first chapter. However, as noted, promoting ideas and industry structuring to carry them out has often proven difficult. In the electronics industry, MITI -- pursuant to authority granted to it under two the previously noted laws promoting the electronics and machinery industries -- tried to get companies to merge.[56] Only after it was unsuccessful in promoting this goal did it encourage the type of joint activities disciosed earlier.[57] In the auto industry, MITI also wanted to restructure the industry through mergers and through emphasizing the domestic market.[58] Its efforts were unsuccessful.

Policy Instruments

Technology Diffusion - The above notwithstanding, MITI and other government agencies have shown great skill in tailoring government assistance to the needs of the industry in question. To promote the nation's computer industry, the government established the Japan Electronics Com-

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[52]Appendix 4 to the record at 4.
[53]Appendix 1 to the record at 47; Mendelowitz statement at 7. Lacey response to supplemental questions at pp. 6-7.
[54]Appendix 1 to the record at 7, 46; Lacey at Id.
[55]Id. at 46.
[56]Mendelowitz statement at 8. See notes 4 and 5 supra.
[57]Id.
[58]Mendelowitz at 106.

puter Corporation (JECC), a leasing program funded by loans from the Japanese Development Bank, so that Japanese companies could compete with IBM.[59] In a similar vein, the Japan Robot Leasing Company, Ltd. (JAROL) was established in 1980 to lease robots to small and medium sized firms.[60] JAROL received no initial capital from the government.[61] However, 60% of its operating funds are derived from the Japanese Development Bank in the form of low interest loans.[62]

Two witnesses cited the promotion of technology diffusion as an important element in Japanese technology policy.[63] The JECC in past years and JAROL, today, are prime examples of such promotion. Further, utilizing funds from the Japanese bicycle tax,[64] the Japanese Government has established regional robotic developmental centers in each prefecture. The centers are designed to diffuse and promote the use of robotics by small and medium-sized companies.[65]

Targeting - Looking at the totality of the government's involvement in technology promotion, John Lacey drew upon the RAM (random access memory) component of the Japanese semiconductor industry to illustrate his view of how the government promotes favored or targeted industries:

> "The targeting process has been straightforward and very well executed. Japan imports a base technology from the West, enhances it through the vehicle of government sponsored cooperative R&D -- then protects the industry from foreign competition in its home market, which, of course, is the fastest growing and second largest market in the world. After gaining experience, economies of scale and consequent cost parity at home, they move out into the world market to further increase production volumes and reduce unit costs. They then use that cost advantage to improve the quality of their product, and eventually they are able to sell a better product at lower prices and at profit margins which are acceptable to them in the context of the Japanese economic system. The result for them is market dominance."[66]

Not everyone agrees with the above characterization, as evidenced by the following Economist excerpt brought to the Subcommittees' attention by Justin Bloom:

> "The structural changes that are chewing their way through big industry in Japan are altering the pattern of invest-

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[59] Appendix 2 to the record at 5.
[60] Id. at 25.
[61] Id. at 26.
[62] Id.
[63] Zysman at 61; Mendelowitz at 58.
[64] Zysman statement at 7.
[65] Id.
[66] Lacey at 26.

ment, too. In a response to slower growth and higher fuel costs, most of Japan's biggest manufacturers and assembly firms in the mid-1970s robbed their investment kitties for replacing ageing equipment and expanding capacity in order to buy new energy-saving plants instead. They did the same again after the second oil shock in 1979.

Not surprisingly, firms that got their investment timing right were in a strong position when the world started clamouring for compact cars, numerically controlled tools and other energy-saving machinery needed for streamlining creaking production lines. The demand then fuelled additional investment (this time to increase output) back in Japan. A virtuous cycle indeed.

It is this, rather than any carefully aimed 'industrial targeting' policy on MITI's part, that has been largely responsible for the surge in Japanese exports that has been sweeping across America and Europe lately."[67]

Trade Policies - Mr. Lacey[68] and others have pointed to the role of trade barriers and import restraints[69] in protecting Japanese industry. In addition to the endemic barriers posed by (i) "buy Japan" attitudes,[70] and (ii) complex distribution systems,[71] other barriers have traditionally dampened exports to Japan. Among these have been cumbersome products certification requirements, a standard setting process that was closed to U. S. producers, lengthy customs procedures and the necessity that a domestic agent shepherd goods through customs.[72] In addition, until recently, U. S. companies were foreclosed from participating in Japanese Government procurement, especially from the $3.3 billion per year market represented by Japan's giant telecommunications monopoly, Nippon Telegraph and Telephone (NTT).[73]

Though Japan has been slow to remove its nontariff trade barriers, considerable progress has taken place in the last year. First, on February 10, 1983, the U. S. and Japanese cabinets approved the recommendations of a U.S.-Japan High Technology Work Group.[74] Among other things, the recommendations, which were brought to the attention of the Subcommittees through discussions with various witnesses or their staffs, establish principles for

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[67]See Report Appendix 1.
[68]Lacey at 26, Lacey response to supplemental questions at pp. 1-4.
[69]Zysman statement at 2.
[70]Zysman at 82.
[71]Japan's complex distribution systems have been referred to as "ultimate nontariff trade barriers." See Staff Analysis Appendix 1, at 13.
[72]Appendix 1 to the record at 43.
[73]Aral at 80.
[74]The High Technology Working Group's recommendations are attached as Appendix 2.

the following: (I) mutual access by each nation to investment opportunities in high technology industries of the other; (II) substantial equivalency for each nation to participate in the markets or the other; (III) elimination of policies that discourage (nonsecurity-related) procurement from foreign firms; and (iv) assurances that foreign firms will have access to government-sponsored R&D programs.[75] The recommendations also include steps for alleviating existing problems and mechanisms for exchanging data.[76]

Second, on May 18, 1983, the Japanese Diet approved legislation, submitted by the Nakasone Cabinet, amending 16 laws relating to import certification and standards. In particular, the Nakasone Cabinet package reversed old laws under which (I) goods had to be certified in Japan for compliance with Japanese law, and (II) companies had to apply for certification through a Japanese agent.[77] Under the revised law, companies will be allowed to submit the results of tests conducted at home, and will be able to apply directly for approval to market products in Japan, without having to go through an agent.[78]

Third, to relieve concern that NTT procurement was still not fully open to U.S. companies, NTT's senior official recently reiterated his interest in greater U.S. firm participation.[79] Though NTT procurement was opened to U.S. firms in 1981, sales have thus far been disappointing, i.e., $16 million in 1981 and $48 million in 1982. NTT's announcement offers hope for larger sales. Some are, however, skeptical. As John Zysman stated:

> "NTT's suggestion that Americans bid on the first track, as it were, of NTT procurement processes has to be tied up with open availability and open and accepted bidding and the winning of bids by American companies in the other tracks. Otherwise what America is doing by participating in those joint ventures is essentially transferring technology which will be developed by, for example, NTT purchasers inside of Japan. At least one Japanese company emphasized to me that whatever was said or done, when it came to the purchases of cutting edge technologies -- the most advanced technologies in which Japanese were potentially producers -- there would be a sustained bias in favor of Japanese purchases."[80]

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[75] Id. at 1-2.
[76] Id. at 3-6.
[77] An account of the changes enacted by the Diet appears in the April 29, 1983, Japanese Economic Institute Report at p. 5.
[78] Id. An account of the remedial effects of the legislation appeared in the New York Times, May 19, 1983, at D-20.
[79] Arai at 80-81.
[80] Zysman at 82.

III. NON-GOVERNMENTAL FACTORS CONTRIBUTING TO JAPAN'S TECHNOLOGICAL SUCCESS

A number of factors independent of any governmental intervention, has played a significant role in Japan's technological success. Among these are the ability to take existing technology -- much of it imported -- and improve upon it and the capability to proceed rapidly down the technological learning curve through volume production. Also of significance is the large number of technically-trained persons graduating from Japan's universities and the productive manner in which technical skills are used at the job site. Flexibility and consensus-taking in labor-management relations plays a major role in Japan's technological success as does the process of national consensus-taking under which ideas are debated by many interest groups before being accepted by the government for implementation.

In addition to a homogeneous society which is supportive of national goals and responds readily to government signals, Japanese industry is well-integrated and able to use domestic markets as a "learning curve", or springboard, for export sales.[81] The "kieretsu" (or "zaibatsu," as it used to be called,) system of interlocking relationships among banks, distributors and manufacturers has contributed to a "buy Japan" attitude.[82] The system links together all phases of the commercial process into highly structured channels of activity that are difficult for outsiders to penetrate. In addition, as described by Magaziner and Hout, industries are well organized along categorical as well as regional lines. As a result, the various industry asociations are able to communicate their positions to the government effectively and comprehensively. National advisory boards, such as the extremely powerful Federation of Economic Organizations, or Keidenren, which represent the nation's major industries, serves to provide government with invaluable input.[83]

Consensus-taking -- the phenomena of disparate industry groups, through hard negotiations, agreeing on those areas of industrial activity most in need of government support -- makes the jobs of agencies such as MITI much easier.[84] Consensus-taking assists the government in both forecasting as well as in the formulation of policy.[85] It is easier to achieve in the context of expanding industries[86] and may even break down in the context of declining industries where companies are being asked to cut

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[81] Lacey at 26; Zysman at 65; Brooks at 18.

[82] The "zaibatsu" system of grouping companies was dissolved during the American occupation. However, the term "zaibatsu" and its modern successor, "kieretsu," are often used interchangeably. For a discussion of the past efforts by the Japanese government to promote "Buy Japanese" behavior through formal agreements with outside firms conducting business in Japan, see Lacey response to supplemental questions at p. 2-3.

[83] Appendix 3 to the record at 5.

[84] Mendelowitz statement at 3; Aral at 104.

[85] Aral at 104.

[86] Mendelowitz at 102.

back production.[87] Additionally, consensus-taking does not characterize the emergence of all major industries in Japan, the auto industry being a prime example of an industry operating on its own initiative.[88] However, as a mechanism for involving the private sector in the decisionmaking process, consensus-taking plays a major role in the formation of government policy and plays an equally significant role in private sector acceptance of government decisionmaking.[89]

On the job site, consensus-taking in the form of consensus management, labor-management committees and worker "quality control circles" gives workers a greater say in production processes and infuses pride in the finished product.[90] Lifetime employment adds to the security of workers and enables each to form a closer attachment to and to better identify with his employer.[91] The system is not, however, without its flaws and, though it applies to one in three employees, many more can be fired at will.[92]

Whatever contribution Japan's flexible approach to management has had on the nation's productivity, product quality -- particularly in the electronics field -- is excellent.[93] Japanese firms attach a high degree of importance to quality control,[94] and have discovered that a "serious commitment to quality impovement [can result] in a reduction of costs and an expansion of market share."[95]

Product quality is further promoted by competition by Japan's leading companies especially within the nation. Some have characterized the competitiveness of Japanese companies as "controlled" in the sense that government direction and incentives have been used both to stimulate competition in desired commercial areas and also to discourage market entry on the part of those firms lacking the appropriate technologies.[96] For example, at a time when Japan was promoting the steel industry, only those firms with efficient plants were encouraged to enter the market.[97] This notwithstanding, competition among domestic Japanese manufacturers is intense with firms in a number of areas "struggling to dominate the domestic market and anxious not to be left behind."[98]

In addition to competition, product quality is benefitted by a society which has become increasingly technocratic and scientifically well-educated. Japan graduates 2.3 times more engineers per capita than we do in the United States. Engineers in Japan become involved in the production processes -- an increasingly infrequent phenomenon in this country.[99]

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[87] Id.
[88] Mendelowitz at 106.
[89] Aral at 104; see Appendix 3 to the record.
[90] Aral at 73-76.
[91] Aral at 74.
[92] See Staff Analysis, Appendix 1, at 14.
[93] Bloch at 36.
[94] Aral at 75.
[95] Aral at 75-76.
[96] Zysman at 64.
[97] Id.
[98] See Report Appendix 2 at 17.

Through lifetime employment at increasing wage scales and longer tours of duty in grade, these professionals master the technology of their employers and add measurably to production quality control.[100]

In addition to the younger workers, Japan's senior management increasingly has become technologically adept. According to Robert Reich, more than 65 percent of all seats on the boards of Japanese manufacturing companies are occupied by trained engineers.[101] By contrast, Reich observes that 40 percent of the chief executive officers of America's largest corporations were trained in law or finance. Accordingly, corporate problems in this country are frequently viewed as legal or financial, resulting in a tendency toward such phenomenon as short-term profit taking to impress shareholders.[102] By contrast, observes Robert Reich, problems in Japan tend to be viewed in a more technical light, resulting in a greater tendency to address such problems through technological change.[103]

Research in Japan tends to be done by larger firms than in the United States,[104] a factor which is significant particularly when the firms in question possess the economic wherewithall to bring laboratory discoveries to commercial fruition. Further, there appears to be a more sharing of information on the part of Japanese firms[105] in the early, more fundamental stages of the innovative process.[106] What Japan lacks, however, is access to a venture capital market.[107] As pointed out by Mr. Arai:

> "While 6.8 billion venture capital financing is available for high tech new business in the United States, which makes a substantial contribution to technological breakthrough, only a fraction of that amount is available for the Japanese counterparts from similar Japanese sources.[108]

Though Japanese technology has often been described as imitative, the characterization ought not to imply technological laggardness. First, following World War II, Japan's technological base was devastated. Accordingly, imitation was the sole means available for restoring its technological and industrial base.[109] Second, Japan employed imitativeness to its eventual advantage, drawing upon technologies from all over the world.[110] Today, there may be as much backward engineering of Japanese

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[99]Brooks at 22.
[100]Id.
[101]A comprehensive account of Reich's observations appears in the March 1983 Atlantic at 43 (Robert Reich, The Next American Frontier).
[102]Lacey at 30.
[103]See footnote 102.
[104]Brooks at 21.
[105]Id.
[106]Id.
[107]Arai statement at 9.
[108]Id.
[109]Zysman at 93.
[110]Brooks at 18.

products as there has been of U. S. products in the past. As Justin Bloom put it:

> "To try to put this issue into realistic context, let me quote from a paper given recently by a senior executive of an American microelectronics corporation:
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> > 'Major U.S. companies have a practice of buying Japanese equipment for the specific purpose of analyzing its features and the manufacturing techniques used to produce it. In the integrated circuit industry in particular the technique of reverse engineering is quite common .....For key state-of-the-art components in (this) industry there are companies that specialize in reverse engineering. These companies are used by both the Japanese and the U.S. manufacturers and they are, therefore, a valuable source of information about the industry in general.'"[111]

In addition to the above, imitation can often serve as a vehicle for innovation[112] and, to the extent mastered, can position the astute imitator well along the competitive learning curve. Japanese companies have proven adept in exploiting learning curves[113] -- a factor which has been linked interdependently with the nation's rapidly expanding economy.[114] Further, in recent years, Japanese firms have not been content merely to proceed on the basis of technology established by others. If one eliminates royalty payments arising from early, long-term contracts, Japan became a net exporter of technology as far back as 1972.[115] Further, one need only reflect on some of the projects considered earlier, e.g., the ICOT "artificial intelligence computer project,"[116] to recognize the direction that will be pursued by Japanese high tech companies during the remainder of the decade.

High governmental deficits and high energy prices have posed some problems for the economic environment in which Japanese companies operate.[117] As to deficits, some have argued that the nation's enormous 19% personal savings rate[118] -- much of it promoted by tax incentives[119] -- will provide the government with sufficient credit to permit continued deficit spending without crowding out the borrowing needs of private

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[111] Appendix 4 to Record at p. 3.
[112] Brooks at 18.
[113] Id.; Zysman statement at 4.
[114] Zysman statement at 4.
[115] Aral at 77.
[116] See Feigenbaum at 112 regarding role of private companies in ICOT program.
[117] Mendelowitz statement at 6.
[118] See Staff Analysis Appendix 1 at 4.
[119] Mendelowitz statement at 5.

industry.[120] As to high energy prices, many of Japan's largest companies retooled during the 1970s to replace aging equipment with new energy saving equipment.[121] However, the toll has been felt by a number of Japan's companies with energy-intensive industries such as petrochemicals and aluminum being forced to retrench.[122]

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120 See Staff Analysis Appendix 1 at 4.
121 Id., at 18.
122 Mendelowitz statement at 7; Aral statement at 7.